INTERRA

CERTIFIED R&D CENTER OF AUTOMATION

Developer of Uniqueness

iSwitch KNX Room Controller

Product Manual

Version 1.0

Contents

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E-mail: info@interra.com.tr

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1. Content of The Document

This document contains Interra's ITR3XX–XXXX coded iSwitch room controller device's electronic and all essential feature information for programming this product. In each subtitle is explained the characteristics of the device. Modifications of the product and special change requests are only allowed in coordination with product management.

2. Product Description

Interra ITR3XX–XXXX iSwitch, is a wall–mounting room controller for on / off switching loads, dimming of lighting devices, control of motor drives or other programmable switching and control functions. At the same time, iSwitch can be used as a secondary product that can act as a room probe or thermostat, at a section of the building or a room, an electronic digital temperature controller, heating, cooling and air conditioning control and regulation. iSwitch room temperature controller is developed according to the KNX standard for use in houses and buildings control systems. iSwitch room temperature controller thanks to integrated sensors is can be used for heating, cooling and air-conditioning and regulation, also can measure room temperature and relative humidity values directly. iSwitch can receive temperature, relative humidity and CO2 concentration values from other bus devices via the KNX bus system. In iSwitch models with LCD, related to room controller function various information can be displayed visually.

iSwitch is equipped with a user interface to display room air conditions and modify the desired setpoint. Depending on the air conditioning infrastructure, the end-user can determine up to 5 different fan speed values manually or automatically, working at an integrated system. iSwitch product range includes 9 different models, there are 3 models with LCD, 6 models without LCD. In models with LCD, LCD is located vertically at the centre area of the product between the gangs. In models without LCD (except the 10 button model) the centre area is designed as a blank cover like the other buttons which got the same materials to provide decorative fit. In 10 button model without LCD, the centre area buttons are designed with the same materials as other button covers that provide decorative fit with 2 separate buttons. All iSwitch models can be programmed with only one database.

iSwitch product can be attached to ETS database file, and the model used in the project is selected on the same file hence it is aimed to program the devices in a flexible structure, and a simple system that is not complex is presented to the implementers.

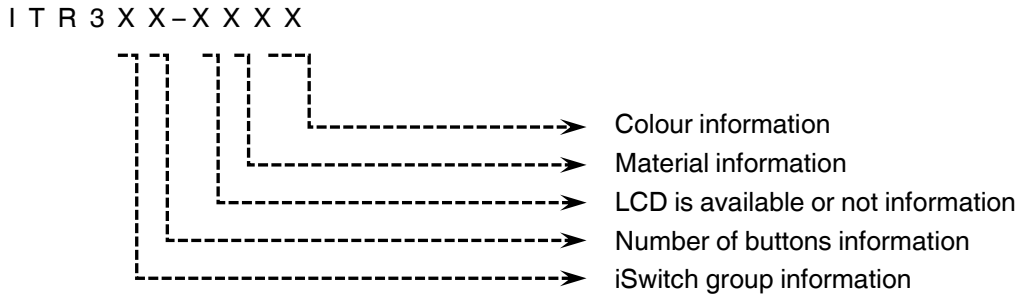
iSwitch is equipped with an integrated KNX bus communication module and is designed for wall installation on a flush mounting box. Several colour variations and materials of plates are available (nonflammable plastic, aluminium, stainless steel, glass and each material has colour options) which can be combined to obtain different combinations. All RAL codes, except the standard ones, can be produced by users request.

2.1. Technical Information

The following table shows the technical information of the Interra iSwitch.

Product Code	ITR3XX–XXXX
Power Supply	KNX Power Supply
Power Consumption	ITR301-0XXX: 10mA ITR308-1XXX: 18mA
Push Buttons	Depending on the model (1 to 10 buttons) 1 x KNX Programming Button
LED Indicators	RGB LEDs for each button 1x Blue Navigation LED 1x Red Programming LED
Sensors	Temperature Sensor (±0.2°C sens.) Humidity Sensor (±2 %RH C sens.)
Interfaces	VA-Type low power LCD
Mode of Commissioning	S-Mode
Type of Protection	IP 20
Temperature Range	Operation (– 5°C …45 °C) Storage (– 20°C …60 °C)
Maximum Air Humidity	< 90 RH
Colour	Buttons: Depends on models Back Cover: Matte Black
Dimensions	90 x 90 x 12 mm (W x H x D)
Certification	KNX Certified
Configuration	Via ETS Software

2.2. Models And Variations



Models with LCD

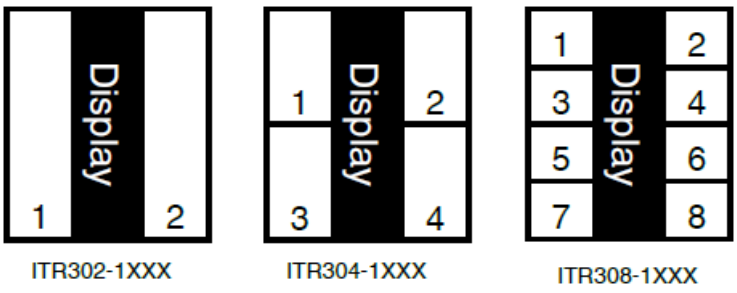


Fig. 1 : View of 3 different models with LCD

Models without LCD

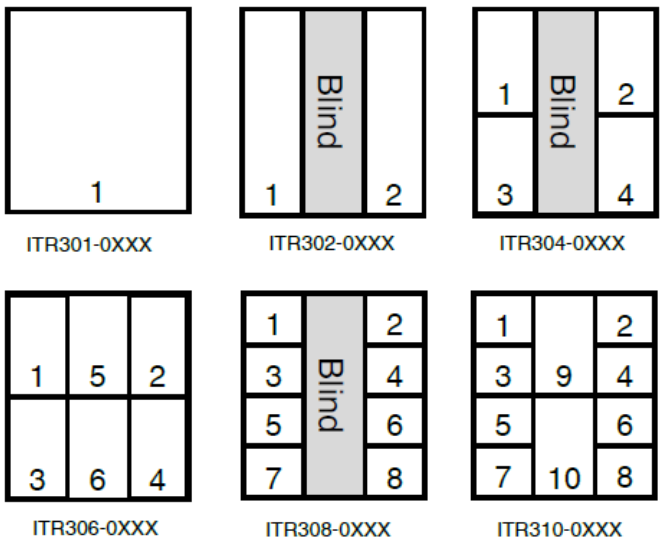


Fig. 2 : View of 6 different models without LCD

Materials and Colour Options

Material and colour options can be exclusively designed for special projects.

Non – Flammable Plastic	Aluminium	Stainless Steel	Glass
01 – Black	00 – Natural	00 – Natural	01 – Black
02 – Glossy White	01 – Black		02 – White
03 – Matt White	02 – Champagne		
04 – Anthracite Matt			
05 – Metallica Gray			

2.3 Dimensions

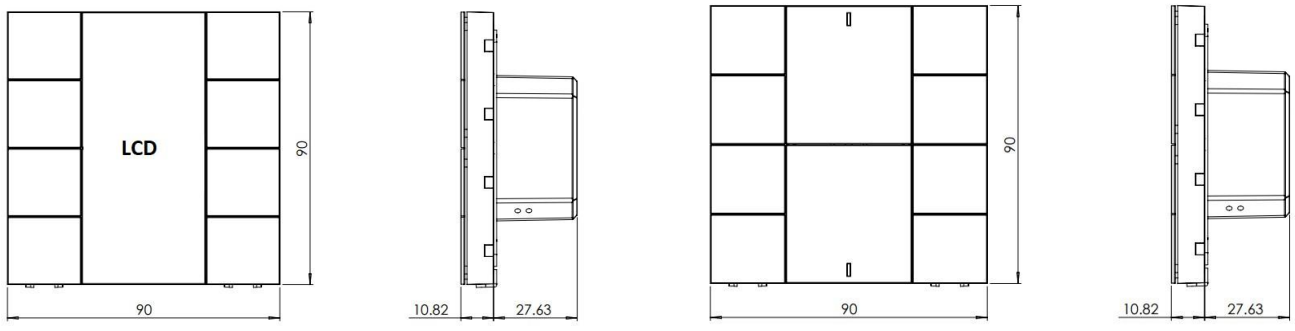


Fig. 3 : Dimensions of the iSwitch

• All values given in the device dimensions are millimetres.

All of the iSwitch models, with or without LCD, have got the same dimensions.

2.4. Functional Descriptions

The prominent features of the iSwitch are followings :

- All 9 models can be programmable with only one database.
- Switching, toggle, dimming, shutter/blinds controls, predetermined scenes by users, value functions that can send presented values, 2 channels control functions, thermostat air conditioning functions, step switching mode features are available.
- Scenes from 1 to 64 can be specified and these scenes can be implemented by request.
- Thermostat air conditioning functions can be used and switched between air conditioning modes.
- Room temperature regulation can be done with 2 – Points(Hysteresis), PWM or Continuous PI control options.
- Operating modes : comfort, standby, economy and building protection.
- Automatic switching between operating modes via KNX bus line.
- Temperature measuring through integrated sensors with the possibility of sending the value on the bus.
- Relative humidity measuring through integrated sensors with the possibility of sending value on the bus.
- Humidification and dehumidification control.
- LED configuration is available.
- Locking is available for all features.
- Ventilation control with continuous or 5 – speed regulation
- Internal or external conditions can be sent to the bus line within the operating modes.
- External – internal temperature, (measured, setpoint, outdoor values as ºC and ºF), operating mode, settings, CO2 concentration, fan control, humidity, on/off features are displayed on LCDs.

2.5. Connection To The KNX Bus And Programmıng

The connection of the KNX bus line is made with the terminal block (black/red socket group) included in delivery and inserted into the slot of housing.

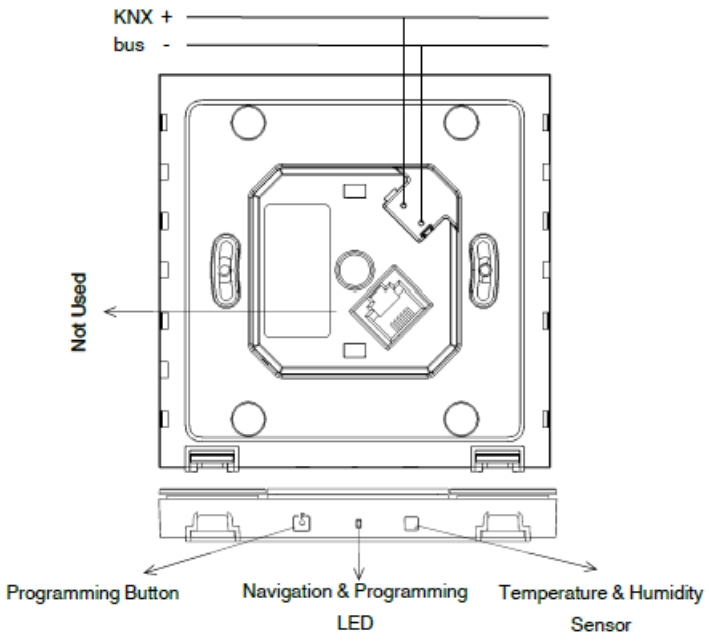


Fig. 4 : Connection to KNX and Programming Button

After pressing the buttons on the top left and bottom left corner of the device simultaneously, the programming LED is activated by pressing the button in the bottom right corner and the LED's red light is on. Also, this can be done by pressing the programming button as another method. In these circumstances, the device is ready for programming.

3. Mounting

The iSwitch's mounting steps are described below. The procedures are described in 2 main sections: Mounting of BCU and Mounting of Application board.

Mounting of BCU

The device is suitable for use in dry interior rooms and can only be mounted on a standard-sized round or square wall flush mounting box. The BCU should be mounted after the wall painting process is finished. Otherwise, the product's cosmetics may be damaged. The mounting steps are shown below.

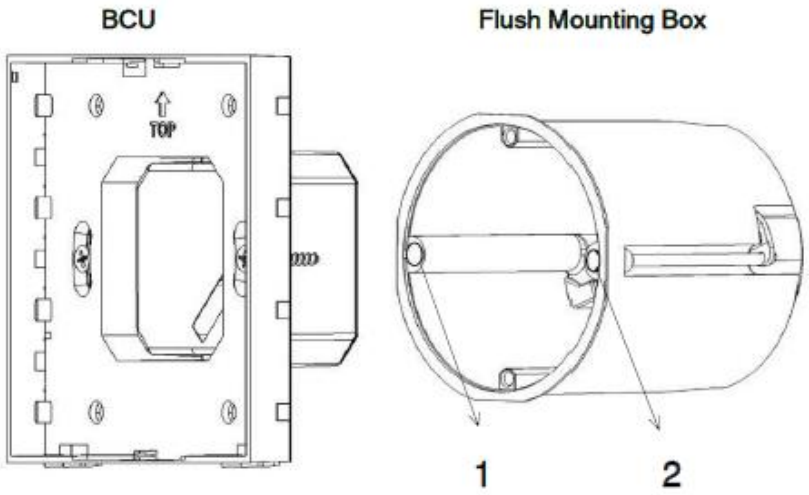


Fig. 5 : Mounting the BCU to Flush Mounting Box

1-) First, the wall flushes mounting box installation whether is done properly should be checked.

2-) Second, iSwitch's BCU part is placed to wall flush mounting box considering the "TOP" writing which is located on the upper side of the BCU must be demonstrated up direction.

3-) Third, the screws are guided through number "1" and number "2" holes that are shown above.

4-) Finally, The BCU should be aligned by scales that are positioned decently, then tighten the guided screws.

Mounting of Application Board

After a successful BCU mounting, iSwitch's Application Board must be mounted on the BCU part. The mounting steps are described below.

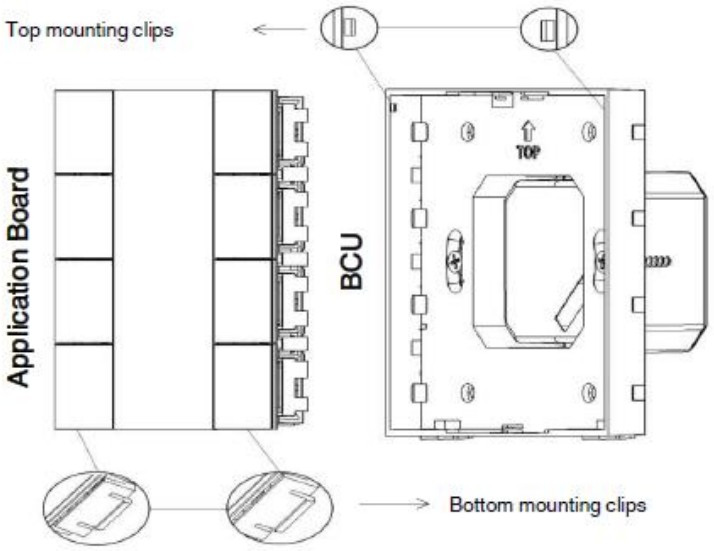


Fig. 6 : Mounting the Application Board to BCU

1-) First, the communication connector on the Application board will be attached to the BCU part.

2-) Second, when the connection is succeeded, the Application board is ready to be connected and it must be slightly approached to BCU.

3-) Third, Application Board should be held at an angle of approximately 45 degrees, after that its top side notches must be inserted to BCU top hidden mounting clips.

4-) Finally, lower side notches should be gently seated in the slot of the BCU side.

Demounting of Application Board

1-) First, lower side notches are pushed back from the underside of the device.

2-) Second, Application Board should be held at an angle of approximately 45° and the top side notches are pulled from the top of the device.

3-) Third, Application Board's communication connector should be removed from the BCU.

4-) Finally, the application board is demounted from the BCU.

4. iSwitch Internal Components

Models with LCD

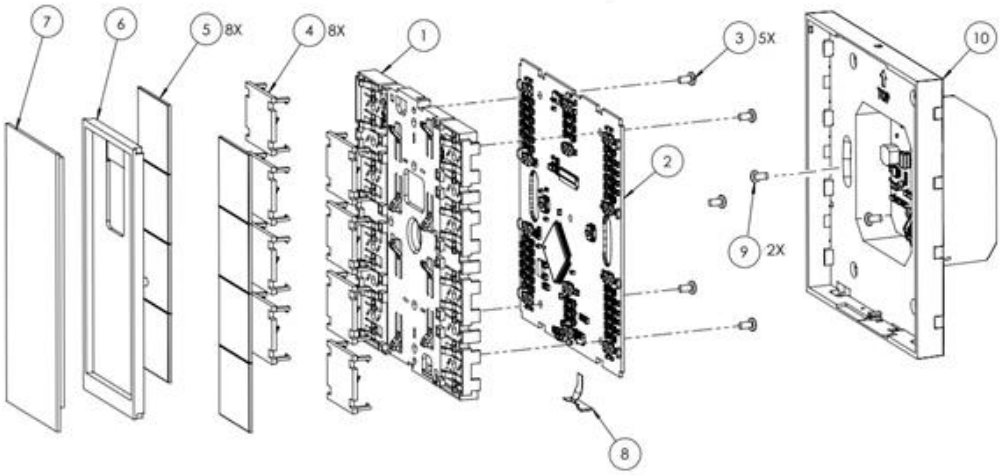


Fig. 7 : Internal Components of Models with LCD

Item No	Part Name	Description	Qty.
1	Front Cover	ABS – PC Front cover	1
2	Main Board	Hardware depends on models	1
3	Screw	M 2x4 (mm)	5
4	Button Mechanism	ABS – PC button mechanism	8
5	Button Cover	Depends on the material selection	8
6	LCD Cover	ABS-PC plastic LCD cover	1
7	LCD Display	VA – Type LCD	1
8	Sensor & LED	Temperature & humidity sensor, navigation & programming LED	1
9	Screw	M 2x4 (mm)	2
10	BCU	Common for all models	1

Models without LCD

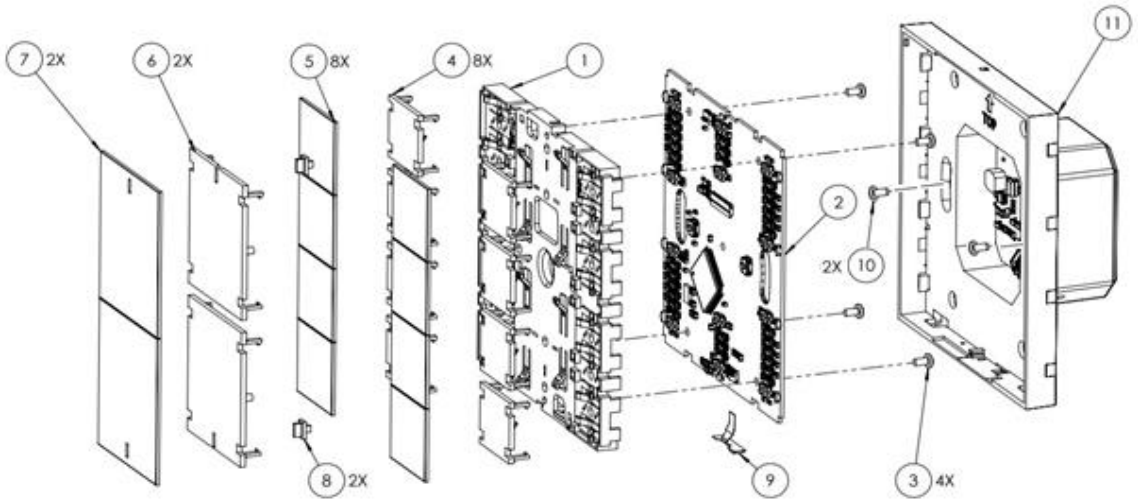


Fig. 8 : Internal Components of Models without LCD

Item No	Part Name	Description	Qty.
1	Front Cover	ABS – PC Front cover	1
2	Main Board	Hardware depends on models	1
3	Screw	M 2x4 (mm)	5
4	Button Mechanism	ABS – PC button mechanism	8
5	Button Cover	Depends on the material selection	8
6	Button Mechanism	ABS-PC button mechanism	1
7	Button Cover	Depends on the material selection	1
8	Front Diffuser	LED diffuser	1
9	Sensor & LED	Temperature & humidity sensor, navigation & programming LED	2
10	Screw	M 2x4 (mm)	1
11	BCU	Common for all models	1

5. ETS Parameters and Objects

5.1. General Page

When the iSwitch is attached to the project from the ETS program, a configuration setting must be made primarily before loading, depending on the model to be programmed. When entering the “GENERAL” in the parameter page, the configuration screen will appear shown above. As previously mentioned, all models can be configured via an ETS file thus the programmers can work flexibly.

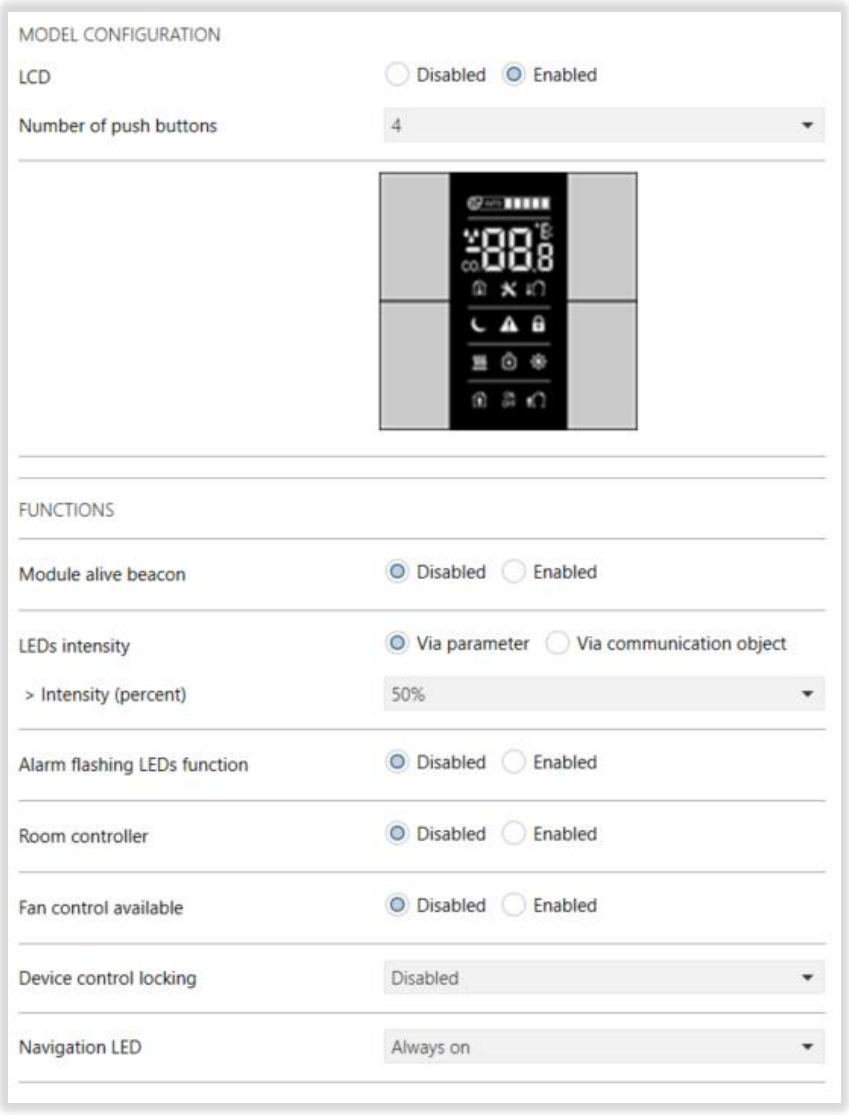


Fig. 9 : General Parameter Configuration Page

According to the model of the device, the programmer can configure the LCD exists or not and the number of push buttons via corresponding tabs. To ensure that the models are selected correct and also to be able to program correctly, the iSwitch model appears on the screen as shown above.

For some reason, the user can able to program the device by choosing the wrong model without realizing it. A feature is available for the programmer to recognize its mistakes: When the programmer performs this operation, all of the push buttons' LEDs on the iSwitch's will start flashing. If the iSwitch model is a model with an LCD, there will be no display on the LCD. Thus, the programmer can easily recognize the fault it did and reconfigure the device with the correct one. Moreover, It is possible to select the action to be performed when the power cut occurs or the KNX bus line power is restored in which the device is connected to the related KNX bus line.

5.1.1. Module Alive Beacon

This function has an important role to detect the device is working or not. By enabling the "Module Alive Beacon" parameter, it is possible to know if the device is working properly. A value of true is sent with a preset time via the "Module Alive Beacon" object. If this telegram is received periodically, it shows that the device is working properly. Since the period time is in seconds, it is better to keep the period time higher in order not to increase the bus line traffic.

5.1.2. LEDs Intensity

LEDs are can be configured via parameter or a 1byte communication object. If it is selected as "via parameter", it is configured multiplies of 10 as a per cent.

5.1.3. Alarm Flashing LEDs Function

This function is used for giving a visual message to the user understanding there is an alarm situation according to the configuration made before. All of the button LEDs will be flashing when this event is triggered.

5.1.4. Device Control Locking

This device can be locked when it is wanted. With the "Device Control Locking" object, when device locking is enabled, the device is locked and no longer sends a telegram to the KNX bus line. The device remembers the previous condition and works in this manner until the locking is disabled.

The device locking function will be enabled after the KNX bus line power cuts are restored.

5.1.5. Navigation LED

Navigation LED is used to show a pleasant display generally in dark ambient. It can be configured via a 1-bit communication object or "always-on" and "always off" parameter options.

5.1.6. Parameters List

PARAMETERS	DESCRIPTION	VALUES
LCD	This parameter determines the model is with or without LCD.	**Enabled** Disabled
Number of push buttons	This parameter determines the number of push buttons depending on the model with or without LCD.	1 2 **4** 6 8 10
Module alive beacon	This parameter allows sending the value “true” periodically while the module is running.	**Disabled** Enabled
Interval (sec)*[1]	This parameter determines the sending period of the “Module alive beacon” in seconds.	**3600** (1…65535)
LEDs intensity	This parameter is used to configure LEDs’ intensity. **Via parameter :** LEDs’ luminance intensity is determined from the parameter settings. Once the “%” configuration is set, the configured parameter settings will be used, unless it is programmed again via ETS. **Via communication object :** LEDs' luminance intensity is determined by a related group address on the KNX bus line. According to the sent value, with a 1-byte data(0..255) the luminance configuration can be done.	**Via parameter** Via communication object
Intensity(percent) *[2]	This parameter, allows you to set the intensity of the LEDs’ in per cent over the ETS parameter.	**50%** (10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%)
Alarm flashing LEDs function	This parameter is used to receive warnings via the LEDs when an alarm event occurs. In the event of an alarm, all LEDs start to flash.	**Disabled** Enabled
Room controller3**	This parameter is used to control the thermostat features. The settings for the room controller is described in detail in the related subtitles.	**Disabled** Enabled
Fan control available	Whether to perform fan controls is set with this parameter.	**Disabled** Enabled

Fan control used for room controller[*4]	This parameter determines the fan controls that are used inside or outside of the thermostat function. If it is selected to use outside of the thermostat function, just the fan states will be displayed on the device.	**Disabled** Enabled
Device control locking	This parameter determines whether the device lock is enabled with an additional locking object. **Disabled :** With this option, the device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to the device control locking object, the device will be locked. **Lock on value 1 :** When a logic 1 value is sent to the device control locking object, the device will be locked.	**Disabled** Lock on value 0 Lock on value 1
Navigation LED	There is navigation LED under the device. This parameter is used to control the determined LED. **Always off :** Navigation LED is permanently off. **Always on :** Navigation LED is permanently on. **Via communication object :** When this parameter is selected, the navigation LED's control will be done with the "LEDs Intensity" object that will be opened in the device object list.	**Always off** Always on Via communication object

[*1]This parameter is only visible when the parameter "Module alive beacon" at the GENERAL parameter page is set to "Enabled".

[*2]This parameter is only visible when the function "LEDs intensity" at the GENERAL parameter page is set to "Via parameter".

[**3]This parameter page is only visible when the function "Room controller" at the GENERAL parameter page is set to "Enabled".

[*4]This parameter is only visible when the parameter "Fan control available" is set to "Enabled".

5.1.7. Object List

Object Name	Function	Type	Flags
Alive Beacon	1 : Enabled / 0 : Disabled	1 bit	CRT
This object is only visible when the “Module Alive Beacon” function is enabled. The device sends “true” values via the connected group address while it is working.			
Leds intensity	10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	1 byte	CWT
The intensity of LEDs’ is set via this object.			
LEDs Flashing Function	1 : Enabled / 0 : Disabled	1 bit	CRWTU
This object controls the flashing action of the LEDs.			
Device Control Locking	0 : Enabled / 1 : Disabled 1 : Enabled / 0 : Disabled	1 bit	CWT
Device control is blocked by this object.			
Navigation LED	1 : Enabled / 0 : Disabled 0 : Enabled / 1 : Disabled	1 bit	CWT
The navigation LED is controlled by this object.			

5.2. Push Buttons Page

5.2.1. Switching

This function is used to perform the switching operation. Depending on the settings configured in the switching process, when the button is pressed or released, the ON or OFF values are generated. After each operation, a telegram is sent to the KNX bus line. Telegram is generated based on the configured settings.

If you want to configure the push button with the “switching” function choose it from the parameter page and then a new object will appear under the device object list on the left side. This object’s name is “switching”. General configurations are made via this object. When the “switching” function is enabled, it is added to the object list of the device. After assigning the group address to this object, attention should be paid to the type of data it uses. It is a good technique to use default data types.

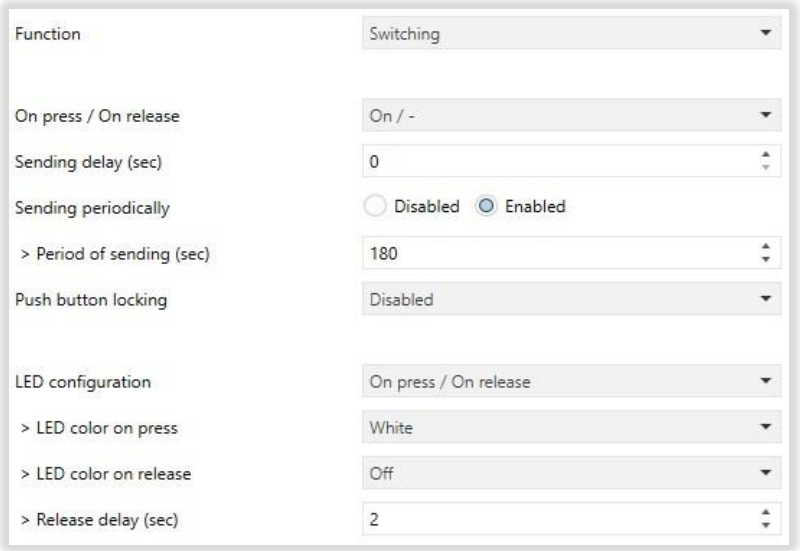


Fig. 10 : Switching Function Configuration

5.2.1.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
On press / On release	This parameter determines how the push buttons will work with the switching control function. **On / – :** When pressed to push button ON value will be sent, when released nothing will be sent. **Off / – :** When pressed to push button OFF value will be sent, when released nothing will be sent. **– / On :** When pressed to push button nothing will be sent, when released ON value will be sent. **– / Off :** When pressed to push button nothing will be sent, when released OFF value will be sent.	**On / –** Off / – – / On – / Off
Sending delay (sec)	When an event occurs, this parameter allows configuring telegram sending time to bus line. Values are entered in seconds. Entering the "0" value means which the telegram is sent to the bus line without delay.	**0** (0…255)
Sending periodically	This parameter is used to periodically send the commands to the bus line.	**Disabled** Enabled
Period of sending (sec)* [1]	This parameter determines sending periods of the commands to the bus line.	**0** (0…255)
Push-button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure* [2]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure.	**Previous value** Locking enabled Locking disabled

	Locking disabled : Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	
Behaviour at beginning of locking* [2]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off
Behaviour at end of locking* [2]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off. **Led status object :** LED’s control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press* [3]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release* [3]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) * [3]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on* [4]	LED color is selected by this parameter when the status is “ON”.	White (Red, Green, Blue, White)
LED color for off [4]	LED color is selected by this parameter when the status is “OFF”.	Off (Red, Green, Blue, White, Off)
Polarity* [4]	LED’s polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible when the parameter “Sending periodically” is set to “Enabled”.

[*2]This parameter is only visible, when the parameter “Push-button locking” is set to “Lock on value 0” or “Lock on value 1”.

[*3]This parameter is only visible, when the parameter “LED configuration” is set to “On press / On release”.

[*4]This parameter is only visible, when the parameter “LED configuration” is set to “LED status object”.

5.2.1.2. Objects List

The following objects can be used via the switching function.

Object Name	Function	Type	Flags
Button X – Switching	1 – On / 0 – Off	1 bit	CWT
Switching telegram will be sent via this object connected to a related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CWT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – ON / 0 – OFF	1 bit	CWT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.2. Toggle

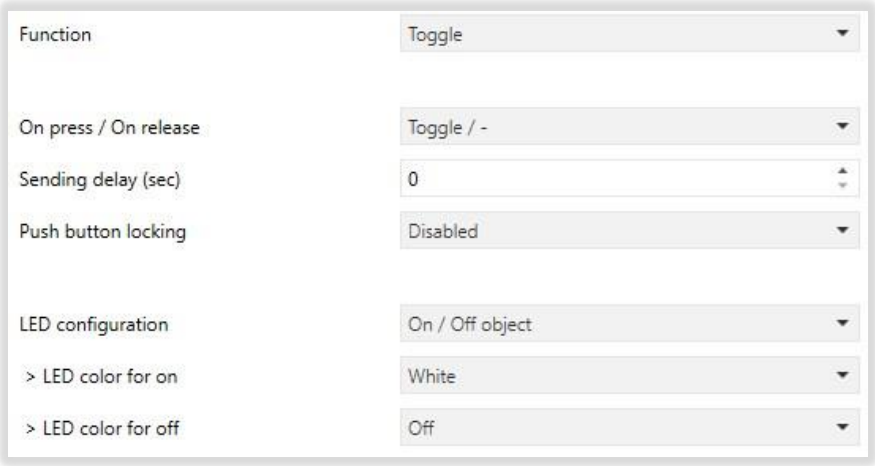


Fig. 11 : Toggle Function Configuration

While the Toggle function is selected, every time the button is pressed, the value ”1” or “0” value is sent to the bus line via the object of the push button. If the first time the button is pressed and the “1” value is sent, when the button is pressed next time the value “0” will be sent. Every press to the push button the output value is always changed to “1” or “0” and they will be sent to the bus line. The current values of the object can be updated by the devices at the same KNX bus line. There is a push-button status object to prevent sending wrong commands to the bus line. 4 different objects can be programmed with the toggle function. These objects are shown below.

5.2.2.1. Parameters List

PARAMETERS	DESCRIPTIONS	VALUES
On press / On release	This parameter determines how the push buttons will work with the toggle control function. **Toggle / – :** When pressed to the push button, inverted values of the current ones will be sent. **– / Toggle :** When the push button is released, inverted values of the current ones will be sent. **Toggle / Toggle :** When pressed to push button, inverted values of the current ones will be sent. After that, when the push button is released, inverted values of the updated ones will be sent.	**Toggle / –** – / Toggle Toggle / Toggle
Sending delay (sec)	When an event occurs, this parameter allows configuring telegram sending time to bus line. Values are entered in seconds. Entering the "0" value means which the telegram is sent to the bus line without delay.	**0** (0…255)
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure* [1]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled

Behaviour at beginning of locking* [1]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off Toggle
Behaviour at end of locking* [1]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off Toggle
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On / Off object :** When pressed to push button and ON value is generated, the colour of the LED is set to ON status setting value. The same applies are valid for OFF status. **Feedback object :** The push button’s configured LED colour for ON and OFF status, is turned on via the toggle function feedback object. **On press / On release :** When the push button is pressed or released, the configured colour of the push-button LED is turned on. **Led status object :** LED’s control is done via led status object.	**Always on** Always off On / Off object Feedback object On press / On release LED status object
LED color on press* [2]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release* [2]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) * [2]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on* [3]	LED color is selected by this parameter when the status is “ON”.	White (Red, Green, Blue, White)

LED color for off [3]	LED color is selected by this parameter when the status is “OFF”.	Off (Red, Green, Blue, White, Off)
Polarity* [4]	LED’s polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible, when the parameter “Push button locking” is set to “Lock on value 0” or “Lock on value 1”.

[*2*]This parameter is only visible, when the parameter “LED configuration” is set to “On press / On release”.

[*3]This parameter is only visible, when the parameter “LED configuration” is set to “On / Off object”, “Feedback object” or “LED status object”.

[*4]This parameter is only visible, when the parameter “LED configuration” is set to “Feedback object” or “LED status object”.

5.2.2.2. Objects List

The following objects can be used via the toggle function.

Object Name	Function	Type	Flags
Button X – Switching	On / Off	1 bit	CRT
Toggle telegram will be sent via this object connected to related group address.			
Button X – Feedback On / Off	Status	1 bit	CRWU
Output status is shown via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CRT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CRT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.3. Dimming

Fig. 12 : Dimming Function Configuration

This feature enables increasing or decreasing of lighting circuit's lighting level. There are 2 different objects for each function and they are controlled by button pressing times. Pressing a short time to the push button, the on or off value(1 bit) is sent via the "On / Off" object. If the push button is pressed longer time, this action is interpreted as a dimming function and value(4 bit) is sent via the "dimming" object. The minimum time to detect the long-press action is configured via parameter. When the button is released after a long press, the "stop" telegram is sent to the bus line and dimming control is over. Dimming control can be done by 1 button toggle or 2 button up / down control modes.

Dimming control by 1 button ; At this option, 1 push-button is used for dimming control. Short presses are always interpreted as recursive ON or OFF toggle (function described above) control events. When long press action occurs, each time-pressed to button, "up" or "down" values(4 bit) are sent via dimming object to bus line. IF the first time long-press is sent as "up" command, the next one's value is sent inverted as "down". There is a push-button status object to prevent sending wrong commands to the bus line and the current values of the object can be updated by the devices at the same KNX bus line. This object must be connected to the actuator's status parameter via related group address. **Dimming control by 2 buttons;** At this option, 2 push-button is used for dimming control. Each command executes the parameters described as "up" and "down" via the "direction" parameter. If a push-button is configured as "up", each short press sends an "ON" command to the bus line. As long as the same button is pressed, a 4-bit value is sent to increase the lighting level via a "dimming" object. If a push-button is configured as "down", each short press sends the "OFF" command to the bus line. As long as the same button is pressed, a 4-bit value is sent to decrease the lighting level via a "dimming" object. 5 different objects can be programmed with a dimming function.

5.2.3.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Control mode	This parameter is used for configuring the dimming function as “1 button toggle” or “2 buttons up/down” control modes. **1 Button toggle :** When the push button is pressed short time, an inverted value is sent to the bus line instead of the current one via the “On / Off” object. If the push button is pressed a long time, “up” or “down” telegram is sent via “dimming” object. After a long press action, when the button is released, a “stop” telegram is sent to the bus line. **2 Buttons up / down :** When the push button is pressed short time, the “ON” value corresponds to the “UP” direction parameter or the “OFF” value corresponds to the “DOWN” direction parameter. Its value is sent via the “ON / OFF” object. **:** When the push button is pressed a long time, a dimming telegram is sent via “dimming” object. After a long press action, when the button is released, a “stop” telegram is sent to the bus line.	**1 Button toggle** 2 Buttons up / down
Direction[1]	This parameter determines the behaviour of the push button’s when the “the 2 buttons dimming” object is selected. **Up :** When the push button is pressed short time, “the ON” value is sent via “the On / Off” object. When the push button is pressed long time, “the UP” value is sent via “the Dimming” object. **Down :** When the push button is pressed short time, the “OFF” value is sent via the “On / Off” object. When the push button is pressed long time, “the DOWN” value is sent via “the Dimming” object.	**Up** Down

Long press duration	This parameter determines the minimum value to detect long-press action.	0.4 sec **0.5 sec** 0.6 sec 0.7 sec 0.8 sec 0.9 sec 1.0 sec
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure* [2]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking* [2]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off
Behaviour at end of locking* [2]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off

LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed. **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off. **Led status object :** LED's control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press* [3]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release* [3]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) * [3]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on* [4]	LED color is selected by this parameter when the status is "ON".	White (Red, Green, Blue, White)
LED color for off* [4]	LED color is selected by this parameter when the status is "OFF".	Off (Red, Green, Blue, White, Off)
Polarity* [4]	LED's polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible when the parameter "Control mode" is set to "2 Buttons up / down".

[*2]This parameter is only visible, when the parameter "Push button locking" is set to "Lock on value 0" or "Lock on value 1".

[*3] This parameter is only visible, when the parameter "LED configuration" is set to "On press / On release".

[*4] This parameter is only visible, when the parameter "LED configuration" is set to "LED status object".

5.2.3.2. Objects List

The following objects can be used via the dimming function.

Object Name	Function	Type	Flags
Button X – Switching	On / Off	1 bit	CRT
Toggle telegram will be sent via this object connected to related group address.			
Button X – Feedback On / Off	On / Off Status	1 bit	CRWU
This object can only be seen when the “1 button toggle” control mode is selected. Output status is shown via this object connected to related group address.			
Button X – Dimming	Dimming control 1 – Step Up / 0 – Step Down	4 bit	CWT
Toggle telegram will be sent via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CWT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CWT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.4. Shutter / Blinds

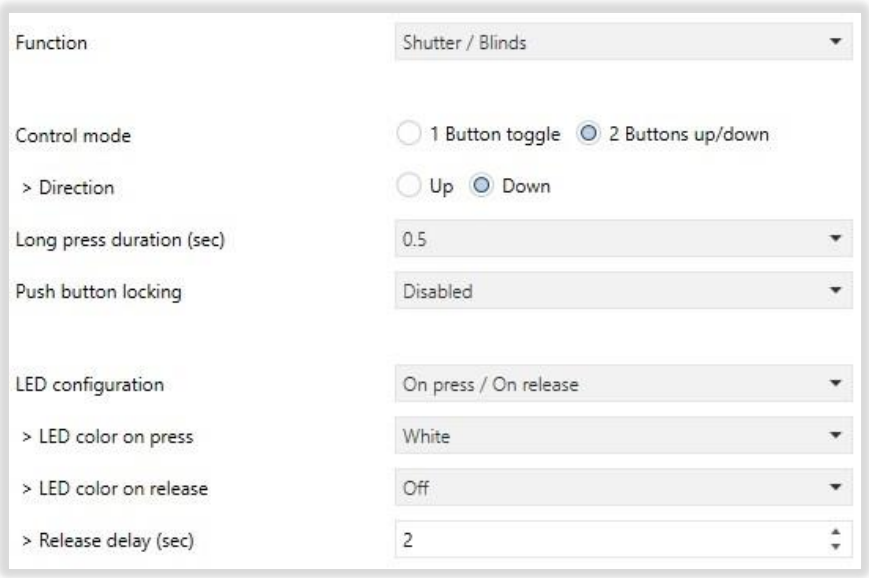


Fig. 13 : Shutter/Blinds Function Configuration

A shutter/blinds circuit can be controlled up – down or on-off methods with “slat angle/stop” object by courtesy of this feature. Each function has 2 different “up / down” and “slat angle/stop” objects. At the control of shutter/blinds circuit, short press of the button sends “step movement” telegram and long press of the button sends “nonstop movement” telegram to bus line. A shutter/blinds circuit is controlled by “1 button toggle” or “2 buttons up/down” control modes.

Shutter / blinds circuit control with 1 button ; Push up, pull down and stop controls can be done with 1 push button. At every time of short press, the push button will send the following sequential values in the form of ; down movement, stop, up movement and stop. The movement aspect of the shutter or slat angle adjustment aspect always depends on the previous action. There is a push-button status object to prevent sending wrong commands to the bus line and the current values of the object can be updated by the devices at the same KNX bus line. This object must be connected to actuator’s status parameter via related group address.

Shutter / blinds circuit control with 2 buttons ; 2 buttons must be used for this option. If both buttons are configured, with long-press action the shutter can be moved up or down and with short press action, the movement stops or slat angle step movement can be configured. The minimum time to detect the long-press action is configured via parameter. Every command controls the buttons defined as “Up” or “Down” via the “Direction” parameter. When short pressed to button configured as “up”, it sends “up” value to bus line, and when short pressed to the button configured as “down”, it sends “down” value to bus line.

5.2.4.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Control mode	This parameter is used to configure the shutter/blinds function as “1 button toggle” or “2 buttons up / down”. **1 Button toggle :** At every time of short press, the push button will send the following sequential values in the form of ; “down”,” stop”, “up” and “stop”. **2 Buttons up / down :** 2 individual push buttons are used for “up” and “down” commands. According to direction configured before, when short pressed to buttons the “step/stop” event occurs and when long pressed, “up” or “down” event occurs.	**1 Button toggle** 2 Buttons up / down
Direction*[1]	This parameter is used to configure the up or down operation of the shutter/blinds function.	Up **Down**
Long press duration*[2]	This parameter determines the minimum value to detect long-press action.	0.4 sec **0.5 sec** 0.6 sec 0.7 sec 0.8 sec 0.9 sec 1.0 sec
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1

Locking after voltage failure* [2]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking* [2]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off
Behaviour at end of locking* [2]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** On Off
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the configured colour of the push-button LED is turned on. **Led status object :** LED’s control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press* [3]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release* [3]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) * [3]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on* [4]	LED color is selected by this parameter when the status is “ON”.	White (Red, Green, Blue, White)
LED color for off* [4]	LED color is selected by this parameter when the status is “OFF”.	Off (Red, Green, Blue, White, Off)

Polarity* [4]	LED's polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible when the parameter "Control mode" is set to "2 Buttons up / down".

[*2]This parameter is only visible, when the parameter "Push button locking" is set to "Lock on value 0" or "Lock on value 1".

[*3] This parameter is only visible, when the parameter "LED configuration" is set to "On press / On release".

[*4] This parameter is only visible, when the parameter "LED configuration" is set to "LED status object".

5.2.4.2. Objects List

The following objects can be used via the shutter/blinds function.

Object Name	Function	Type	Flags
Button X – Slat Angle / Stop	1 – On / 0 – Off	1 bit	CRT
Stop telegram will be sent via this object connected to related group address.			
Button X – Up / Down	0 – Step Up / 1 – Step Down	4 bit	CWT
Up and down telegrams will be sent via this object connected to related group address.			
Button X – Up / Down Status	0 – Step Up / 1 – Step Down Status	4 bit	CWT
This object can only be seen when “the 1 Button toggle” control mode is selected. Output status is shown via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CWT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CWT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.5. Value

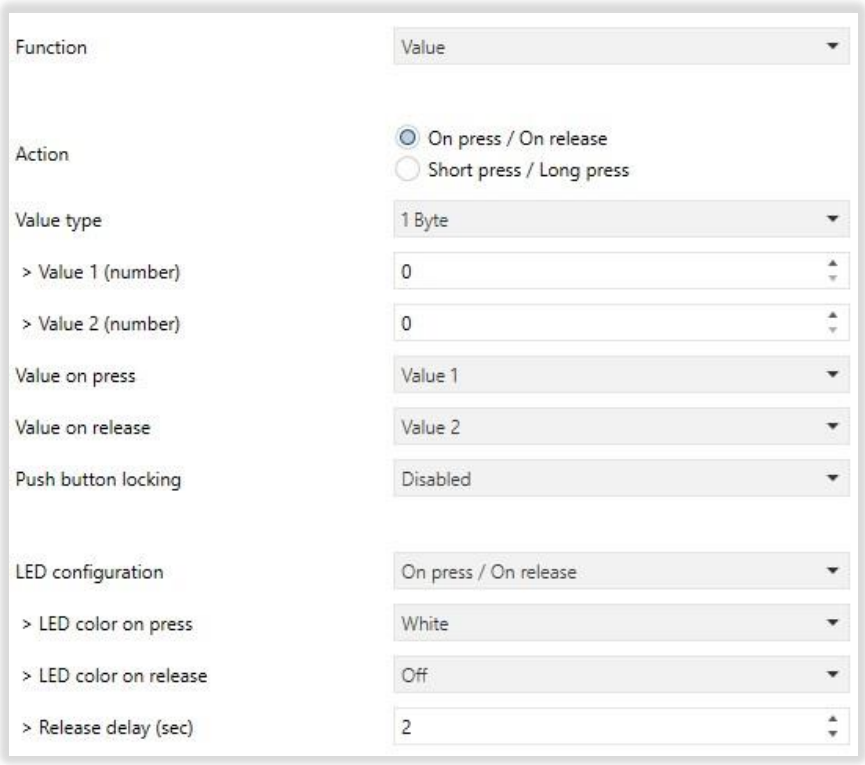


Fig. 14 : Value Function Configuration

This function is used to send the value or values previously defined by the parameters to the button. It is possible to choose up to 5 different types of data point types.

1 – Byte Value	Used for 1 – byte(0…255) data sending or to activate scene execute functions.
2 – Byte Value	Used for 2 – byte(0…65535) data sending.
Percentage	Used for 1 – byte percentage value. sending.
Temperature	Used for 2 – byte temperature value sending.
Luminosity	Used for 2 – byte lux value sending.

5.2.5.1. Parameters List

PARAMETRE	AÇIKLAMA	DEĞERLER
Action	This parameter determines the operating status of the button. **On press / On release :** The value is sent when the button is pressed or released. **Short press / Long press :** The value is sent when the button is short pressed or long pressed.	**On press / On release** Short press / Long press
Long press duration (sec)*[1]	This parameter determines the minimum value to detect long-press action.	**3,0** (0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0)
Value type	This parameter determines the value type that will be sent. **1 – Byte Value :** (0…255) **0** **2 – Byte Value :** (0…65535) **0** **Percentage :** 1 byte in steps of 1. (0…100%) **0** **Temperature :** 2 byte in steps of 0.5 (0.0…50.0°C) **20.0°C** **Luminosity :** 2 byte in steps of 50.0 (0…1000 lux) **300 lux**	**1 – Byte** 2 – Byte Percentage Temperature Luminosity
Value 1,2 (number, %, ˚C, lux)	This parameter determines the value will be sent.	(0…255) **0** (0…65535) **0** (0.0…50.0°C) **20.0°C** (0…1000 lux) **300 lux**
Value on short press	This parameter determines which value will be sent by short press action.	None **Value 1** Value 2 Value 1 & Value 2
Value on long press	This parameter determines which value will be sent by long-press action.	None Value 1 **Value 2** Value 1 & Value 2

Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure*2	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking*2	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Value 1 Value 2 Value 1 & Value 2
Behaviour at end of locking*2	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Value 1 Value 2 Value 1 & Value 2
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off.	**Always on** Always off On press / On release LED status object

	Led status object : LED's control is done via led status object.	
LED color on press*3	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release*3	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) *3	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on*4	LED color is selected by this parameter when the status is "ON".	White (Red, Green, Blue, White)
LED color for off*4	LED color is selected by this parameter when the status is "OFF".	Off (Red, Green, Blue, White, Off)
Polarity*4	LED's polarity is selected by this parameter.	**Normal** Inverted

[1]This parameter is only visible when the parameter "Action" is set to "Short press / Long press".

[*2]This parameter is only visible, when the parameter "Push button locking" is set to "Lock on value 0" or "Lock on value 1".

[*3]This parameter is only visible, when the parameter "LED configuration" is set to "On press / On release".

[*4]This parameter is only visible, when the parameter "LED configuration" is set to "LED status object".

5.2.5.2. Objects List

The following objects can be used via value function.

Object Name	Function	Type	Flags
Button X – Value	1 byte / Percentage	1 byte	CRTU
This object can be either 1 byte (0 – 255) or a percentage value. Values will be sent via this object connected to related group address.			
Button X – Value	Temperature(Celcius) / 2 byte / Luminosity(Lux)	2 byte	CRTU
This object can be 2 bytes (0 – 65535), temperature(˚C) or luminosity value. Values will be sent via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable 1 – Disable / 0 – Enable	1 bit	CRWTU
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	Status	1 bit	CRWTU
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.6. 2 – Channel Mode

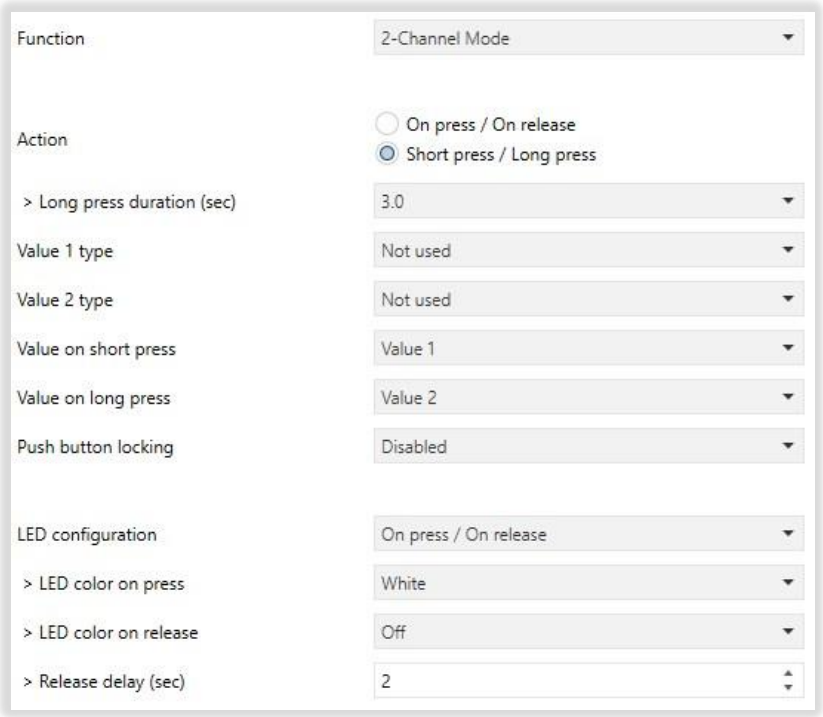


Fig. 15 : 2 Channel Mode Function Configuration

2 – channel mode, is used to perform two different functions by using the same button on the device. All functions which can be defined on push buttons are shown below.

5.2.6.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Action	This parameter determines the operating status of the button. **On press / On release :** The value is sent when the button is pressed or released. **Short press / Long press :** The value is sent when the button is short pressed or long pressed.	**On press / On release** Short press / Long press
Long press duration (sec)*[1]	This parameter determines the minimum value to detect long-press action.	**3,0** (0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0)
Value 1, 2 type	This parameter determines the value type that will be sent. **On :** On telegram **Off :** Off telegram **Toggle :** Sends the Inverted value of the current one. **1 – Byte :** (0…255) **0** **2 – Byte :** (0…65535) **0** **Percentage :** 1 byte (0…100%) **0** **Temperature :** 2 byte 0.5 (0.0…50.0°C) **20.0°C** **Luminosity :** 2 byte (0…1000 lux) **300 lux**	Not used On Off Toggle **1 – Byte** 2 – Byte Percentage Luminosity
Value 1,2 (number, %, ˚C, lux)	This parameter determines the value will be sent.	(0…255) **0** (0…65535) **0** (0.0…50.0°C) **20.0°C** (0…1000 lux) **300 lux**
Value on short press	This parameter determines which value will be sent by short press action.	None **Value 1** Value 2 Value 1 & Value 2

Value on long press	This parameter determines which value will be sent by long-press action.	None Value 1 **Value 2** Value 1 & Value 2
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure* [2]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking* [2]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Value 1 Value 2 Value 1 & Value 2
Behaviour at end of locking* [2]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Value 1 Value 2 Value 1 & Value 2

LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed. **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off. **Led status object :** LED's control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press*3	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release*3	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) *3	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on*4	LED color is selected by this parameter when the status is "ON".	White (Red, Green, Blue, White)
LED color for off*4	LED color is selected by this parameter when the status is "OFF".	Off (Red, Green, Blue, White, Off)
Polarity*4	LED's polarity is selected by this parameter.	**Normal** Inverted

[1]This parameter is only visible when the parameter "Action" is set to "Short press / Long press".

[*2]This parameter is only visible, when the parameter "Push button locking" is set to "Lock on value 0" or "Lock on value 1".

[*3]This parameter is only visible, when the parameter "LED configuration" is set to "On press / On release".

[*4]This parameter is only visible, when the parameter "LED configuration" is set to "LED status object".

5.2.6.2. Objects List

The following objects can be used via 2 – channel mode function.

Object Name	Function	Type	Flags
Button X – Channel 1 Value	1 – On / 0 – Off	1 bit	CWT
This object appears only when the channel 1 control type is selected as “On / Off”.			
Button X – Feedback Channel 1 Value	1 – On / 0 – Off	1 bit	CRT
This object appears only when the channel 1 control type is selected as “toggle”. It shows the current status of value via this object connected to related group address.			
Button X – Channel 1 Value	1 byte unsigned value / Percentage (%)	1 byte	CWT
This object can be either 1 byte (0 – 255) or a percentage value. Values will be sent via this object connected to related group address.			
Button X – Channel 1 Value	Temperature(Celcius) / 2 byte unsigned value / Luminosity(Lux)	2 byte	CWT
This object can be 2 bytes (0 – 65535), temperature(˚C) or luminosity value. Values will be sent via this object connected to related group address.			
Button X – Channel 2 Value	1 – On / 0 – Off	1 bit	CWT
This object appears only when the channel 2 control type is selected as “On / Off”.			
Button X – Feedback Channel 2 Value	1 – On / 0 – Off	1 byte	CWT
This object appears only when the channel 2 control type is selected as “toggle”. It shows the current status of value via this object connected to related group address.			
Button X – Channel 2 Value	1 byte unsigned value / Percentage (%)	1 byte	CWT
This object can be either 1 byte (0 – 255) or a percentage value. Values will be sent via this object connected to related group address.			
Button X – Channel 2 Value	Temperature(Celcius) / 2 byte unsigned value / Luminosity(Lux)	2 byte	CWT
This object can be 2 bytes (0 – 65535), temperature(˚C) or luminosity value. Values will be sent via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CWT

This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.

Button X – LED Status	1 – On / 0 – Off	1 bit	CWT

This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.

5.2.7. Scene

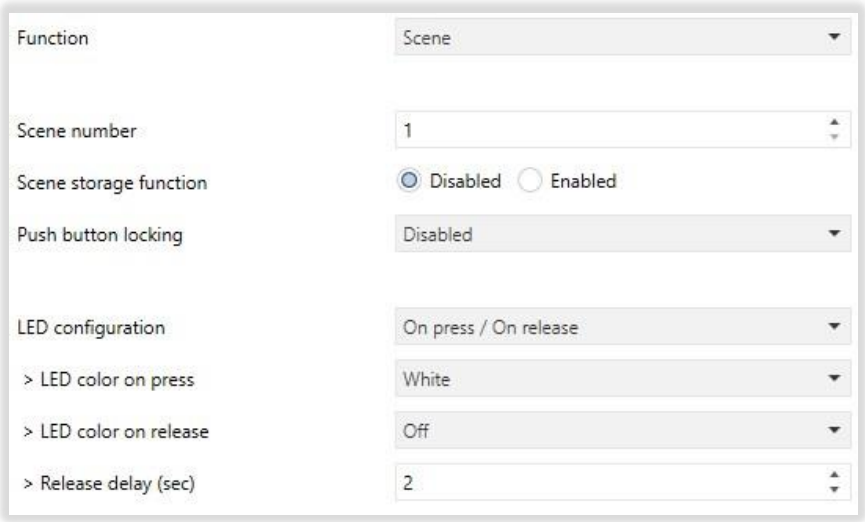


Fig. 16 : Scene Function Configuration

The scene function is used to control devices and make pre-registration of their status with the push button which sends a command via a related group address. This feature allows to register a setting as a scene and after a while, when the same settings or conditions are requested each device can be activated only with 1 command instead of configuring them separately.

This feature in the button sends telegrams that contain “scene run” or “scene register” functions, via the “scene” object. Scene numbers between 1 and 64 can be selected via the related group address. The scene number configured in the button must match the scene number configured on the parameters in other devices. Scene number (1 – 64) is used to run the scene using the related object. The values are sent via related object must be as in form “Scene Number + 128” for registering the scene feature.

If a scenario number is configured as 2 and it is wished to register this scenario, a value of 130 should be sent (128 + 2). If the scenario number is configured as 24, the value of 152 (128 + 24) should be sent for the scenario registering feature.

To run every scene, a time-delayed is defined or not in the parameters should be checked, whether to send with or without time delay or. This feature allows the creation of dynamic scene arrays in which several outputs connect one another with time delay.

After programming with ETS, scene values that are used for parameterization will be written to the actuator. This means related scenes will be erased defined by the customer. Hence, before any maintenance, all configurations should be gotten by the programmer and whether the customer wants to use the same conditions.

5.2.7.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Scene number	This parameter is used to give the scenario number to the generated scenario before.	**1** (1…64)
Scene storage function	The scene register function can be enabled via this parameter. To enable this, it is necessary to press long with a predefined number of seconds.	**Disabled** Enabled
Long press duration (sec)*[1]	This parameter specifies the minimum time to determine the long-press action of a button to register the scene.	**3,0** (0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0)
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to the push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure*[2]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking*[2]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Run Scene
Behaviour at end of locking*[2]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Run Scene

LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off. **Led status object :** LED's control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press[*3]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release[*3]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) [*3]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on[*4]	LED color is selected by this parameter when the status is "ON".	White (Red, Green, Blue, White)
LED color for off[*4]	LED color is selected by this parameter when the status is "OFF".	Off (Red, Green, Blue, White, Off)
Polarity[*4]	LED's polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible, when the parameter "Scene storage function" is set to "Enabled".

[*2]This parameter is only visible, when the parameter "Push button locking" is set to "Lock on value 0" or "Lock on value 1".

[*3]This parameter is only visible, when the parameter "LED configuration" is set to "On press / On release".

[*4]This parameter is only visible, when the parameter "LED configuration" is set to "LED status object".

5.2.7.2. Objects List

The following objects can be used via scene function.

Object Name	Function	Type	Flags
Button X – Scene	1 – 64 : Run/128+Scene–Storage	1 byte	CRT
Scene telegram will be sent via this object connected to related group address.			
Button X – Locking	0 – Disable; 1 – Enable	1 bit	CRT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CRT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.8. Thermostat Extension Control

This function is used to control the thermostat with an external push button. From the “thermostat control” section, thermostat operating modes can be configured as “Change between all operating modes” and “Operating mode individual selection”. Also, another option is “setpoint control” which is used to increase or decrease the temperature setpoints manually.

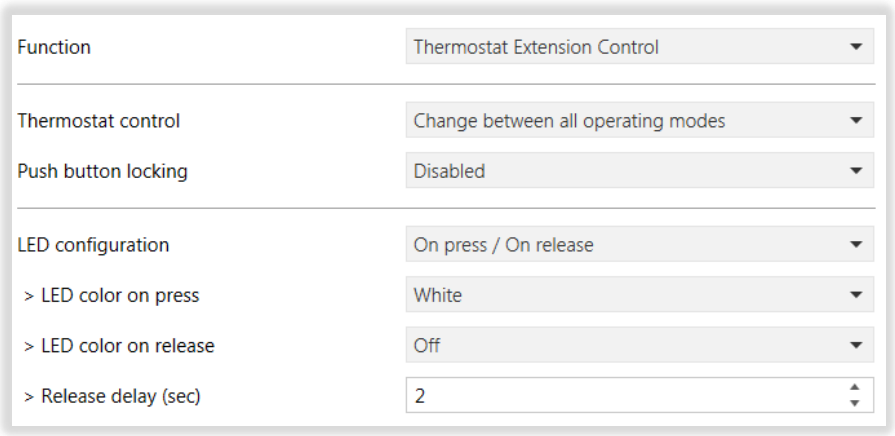


Fig. 17 : Thermostat Extension Control Function Configuration

5.2.8.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Thermostat Extension Control	This parameter indicates the thermostat control options. **Operating mode individual selection** : With this option, the thermostat can be controlled in 4 different modes. These modes are described in the “Selection” section. **Change between all operating modes** : With this option, the thermostat changes the operating modes between them. **Setpoint control** : The thermostat setpoint can be configured via this option.	**Operating mode individual selection** Change between all operating modes Setpoint control
Selection* [1]	This parameter allows mode selection for thermostat control.	**Comfort mode** Standby mode Night mode Building protection mode
Modification by pressing* [2]	This parameter defines how the button function feature works.	**Increase a step** Decrease a step
Step for the setpoint control* [2]	This parameter determines the step value.	**0.5K** (0.1K, 0.5K, 1.0K)
Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Enabled Lock on value 0 Lock on value 1

Locking after voltage failure* [3]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at end of locking* [3]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Run Scene
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the push-button LED is on or off. **Led status object :** LED’s control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press* [4]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)
LED color on release* [4]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) * [4]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on* [5]	LED color is selected by this parameter when the status is “ON”.	White (Red, Green, Blue, White)
LED color for off* [5]	LED color is selected by this parameter when the status is “OFF”.	Off (Red, Green, Blue, White, Off)
Polarity* [5]	LED’s polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible when the parameter “Thermostat control” is set to “Operating mode individual selection”.

[*2]This parameter is only visible when the parameter “Thermostat control” is set to “Setpoint control”.

[*3]This parameter is only visible, when the parameter “Push button locking” is set to “Lock on value 0” or “Lock on value 1”.

[*4]This parameter is only visible, when the parameter “LED configuration” is set to “On press / On release”.

[*5]This parameter is only visible, when the parameter “LED configuration” is set to “LED status object”.

5.2.8.2. Objects List

The following objects can be used via the thermostat extension control function.

Object Name	Function	Type	Flags
Button X – Operating Mode	1 – Comfort 2 – Standby 3 – Night 4 – Building Protection	1 Byte	CRT
The selected operating mode for the push-button is controlled via this object connected to related group address.			
Button X – Setpoint Temperature	Temperature (˚C)	1 Byte	CRT
The selected setpoint temperature for the push-button is controlled via this object connected to related group address.			
Button X – Feedback Setpoint Temperature	Temperature (˚C) status	1 Byte	CRT
This object appears only when the thermostat control type is selected as “Setpoint control”. It shows the current status of setpoint temperature via this object connected to related group address.			
Button X – Locking	0 – Disable; 1 – Enable	1 Bit	CRT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CRT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.2.9. Step Switching

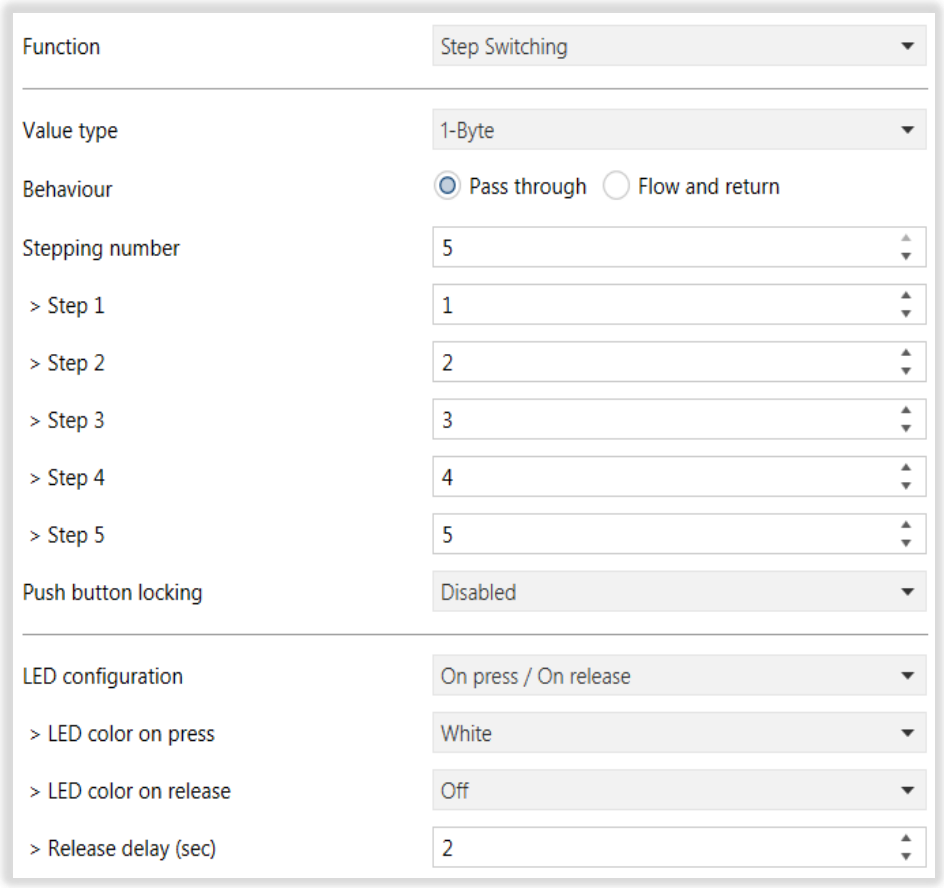


Fig. 18 : Sten Switching Function Configuration

Thanks to the push button's "step switching" feature, It is possible to send fixed values as sequential from 1 to 5 different steps in 1 byte, 2 bytes, percentage, temperature, luminosity or scene objects, which are configured according to the selected value type.

5.2.9.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
Value type	This parameter determines the type of value will be sent. **1 – Byte :** (0…255) **2 – Byte :** (0…65535) **Percentage :** 1 byte (0…100%) **Temperature :** 2 byte 0.5 (0.0…50.0°C) **Luminosity :** 2 byte (0…1000 lux) **Scene :** 1 byte (1…64)	**1 Byte** 2 Byte Percentage Temperature Luminosity Scene
Behaviour	Determines the transmission option of data that will be sent sequentially, each time the push button is pressed. **Pass through :** Send values sequentially and returns to initial value and continue. Ex : 1byte 1,2,3,4,5,1,2,3,4,5 repeats as sequential. **Flow and return :** Send values sequentially and returns to last value and continue. Ex : 1byte 1,2,3,4,5,4,3,2,1 and repeats as sequential.	**Pass through** Flow and return
Stepping number	Determines the number of data to be sent in sequence.	**1** (1…5)
Step 1…5	In this section, the values are entered which will be sent sequentially. 1 byte, 2 bytes, percentage, temperature, luminosity or scene data types can be sent up to the configured amount of steps.	(0...255) (0...65535) (%0...%100) (0...50) (0....1000) (1...64)

Push button locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to the push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to the push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Locking after voltage failure* [1]	**Previous value :** Push-button takes the value at before the voltage failure status. **Locking enabled :** Even if the push button is not locked before voltage failure, the button will be locked after voltage failure. **Locking disabled :** Even if the push button is locked before voltage failure, the button will not be locked after voltage failure.	**Previous value** Locking enabled Locking disabled
Behaviour at beginning of locking* [1]	This parameter allows to change status of the push button or, at the beginning of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Run Scene
Behaviour at end of locking* [1]	This parameter allows to change status of the push button or, at the end of lock status transition, it saves the assigned “on” or “off” values.	**No reaction – Last state** Run Scene
LED configuration	This parameter allows to control LED status of the button. **Always on :** The button LED is always on whether button is pressed . **Always off :** The button LED is always off whether button is pressed or not. **On press / On release :** When the push button is pressed or released, the configured colour of the push-button LED is turned on. **Led status object :** LED’s control is done via led status object.	**Always on** Always off On press / On release LED status object
LED color on press* [2]	This parameter allows to control button LED when push button is pressed.	White (Red, Green, Blue, White, Off)

LED color on release[*2]	This parameter allows to control button LED when push button is released.	Off (Red, Green, Blue, White, Off)
Release delay (sec) [*2]	This parameter determines a release delay for controlling the button LED when push button is released.	**0** (0…255)
LED color for on[*3]	LED color is selected by this parameter when the status is “ON”.	White (Red, Green, Blue, White)
LED color for off[*3]	LED color is selected by this parameter when the status is “OFF”.	Off (Red, Green, Blue, White, Off)
Polarity[*3]	LED’s polarity is selected by this parameter.	**Normal** Inverted

[*1]This parameter is only visible, when the parameter “Push button locking” is set to “Lock on value 0” or “Lock on value 1”.

[*2]This parameter is only visible, when the parameter “LED configuration” is set to “On press / On release”.

[*3]This parameter is only visible, when the parameter “LED configuration” is set to “LED status object”.

5.2.9.2. Objects List

The following objects can be used via the step switching function.

Object Name	Function	Type	Flags
Button X – Step 1 Byte	1 byte unsigned value / Percentage	1 byte	CWT
The 1-byte value sent by this object can be in the range (0 – 255). Values will be sent via this object connected to related group address.			
Button X – Step 2 Byte	Temperature (Celcius) / 2 byte unsigned value / Lux	2 byte	CWT
The 2-byte value sent by this object can be in the range (0 – 65535). Values will be sent via this object connected to related group address.			
Button X – Step Percentage	1 byte / Percentage	1 byte	CWT
The percentage value sent by this object can be in the range (0 – 100). Values will be sent via this object connected to related group address.			
Button X – Step Temperature	Temperature (Celcius) / 2 byte	2 byte	CWT
The temperature setpoint value sent by this object can be in the range (0 – 50°C). Values will be sent via this object connected to related group address.			
Button X – Step Luminosity	Luminosity (Lux) / 2 byte	2 byte	CWT
The luminosity value sent by this object can be in the range (0 – 1000). Values will be sent via this object connected to related group address.			
Button X – Step Scene	Scene control / 1 byte	1 byte	CWT
The scene call value sent by this object can be in the range (0 – 64). Values will be sent via this object connected to related group address.			
Button X – Locking	0 – Disable / 1 – Enable	1 bit	CWT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
Button X – LED Status	1 – On / 0 – Off	1 bit	CWT
This object appears only when the LED configuration parameter is selected as LED status object. It is possible to control the push button LED by configuration is done before.			

5.3. Temperature Sensor Page

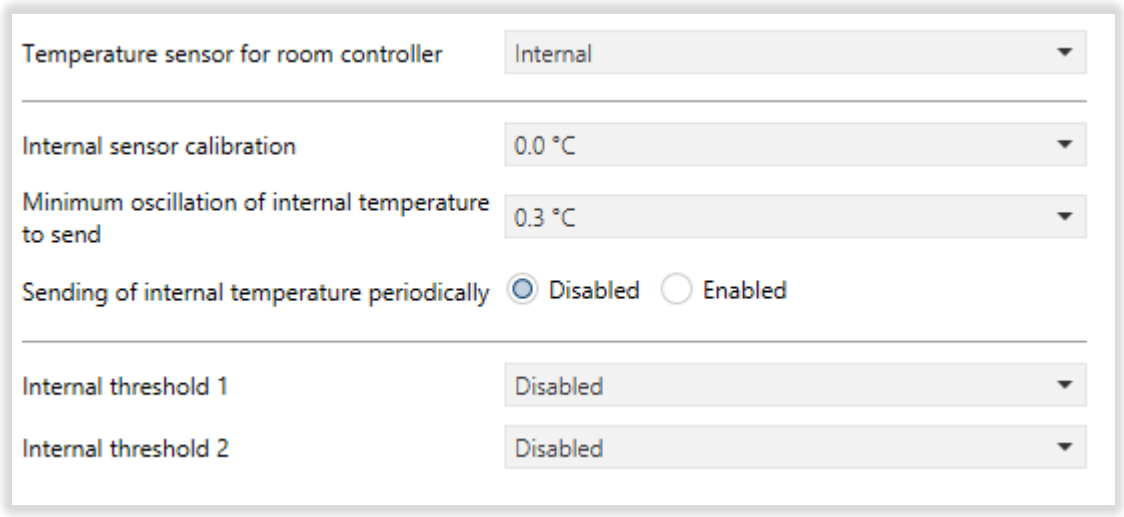


Fig. 19 : Temperature Sensor Configuration Page

An integrated temperature sensor provides to measure the temperature between –10 °C and +50 °C with 0,1 °C accuracy. The measured value can be restored to avoid significant environmental interventions such as proximity to heat sources, external wall mounting, chimney effect from the pipe that connected to the wall mounting box, rising hot air. ± 5 °C calibration interval or the weighted mean value between two different temperature information selected from below can be used.

- The value is measured by the integrated sensor.
- The measured value by an external temperature sensor that connected to the KNX bus line.

5.3.1. Parameters List

PARAMETERS	DESCRIPTION	VALUES
Temperature sensor for room controller	The connection type of the temperature sensor can be determined by this parameter.	**Internal** External Internal & External
External sensor calibration*1	External sensor's calibration can be made by this parameter.	**0,0** (–6,0 … 6,0)
Internal sensor calibration	Internal sensor's calibration can be made by this parameter.	**0,0** (–6,0 … 6,0)
Weighting factor (Internal / External)*2	Which weighted average ratio will be used for the temperature values taken from internal and external sensors can be determined by this parameter.	**100% / 0%,** 80% / 20%, 60% / 40%, 40% / 60%, 90% / 10%, 70% / 30%, 50% / 50%, 30% / 70%, 20% / 80%, 0% / 100%, 10% / 90%,
Minimum oscillation of internal temperature to send	This parameter determines the minimum value change to send the internal temperature information to the KNX bus line.	**0,3** (0,1 … 5,0)
Sending of internal temperature periodically	This parameter provides to send the internal temperature value periodically to the KNX bus line.	**Disabled** Enabled
Period of sending (sec)*3	This parameter determines the sending period of the internal temperature information to the KNX bus line.	**0** (0…255)
Internal threshold 1	The first internal threshold value property is activated by this parameter.	**Disabled** Low High
Lower limit (˚C)*4	The lower limit of the first internal threshold is determined by this parameter.	**5** (–10…50)

Higher limit (˚C)*4	The higher limit of the first internal threshold is determined by this parameter.	**30** (–10…50)
Internal threshold 2	The second internal threshold value property is activated by this parameter.	**Disabled** Low High
Lower limit (˚C) *4	The lower limit of the second internal threshold is determined by this parameter.	**5** (–10…50)
Higher limit (˚C) *4	The higher limit of the second internal threshold is determined by this parameter.	**30** (–10…50)

*1This parameter is only visible when the parameter “Temperature sensor for room controller” is set to “External” or “Internal & External”.

*2This parameter is only visible when the parameter “Temperature sensor for room controller” is set to “Internal & External”.

*3This parameter is only visible when the parameter “Sending of interval temperature periodically” is set to “Enabled”.

*4This parameter is only visible when the parameter “Internal threshold 1” or “Internal threshold 2” is set to “Low” or “High”.

5.3.2. Objects List

Object Name	Function	Type	Flags
Actual Internal Temperature	Temperature (Celcius)	2 Byte	CRTU
This object provides to measure the actual internal temperature with an internal sensor, via connected to the related group address.			
External Temperature Sensor	Temperature (Celcius)	2 Byte	CRWTU
This object provides to measure the actual internal temperature with an external sensor, via connected to the related group address.			
Actual External Temperature	Temperature (Celcius)	2 Byte	CRTU
This object provides to measure the actual external temperature with an external sensor, via connected to the related group address.			
Actual Internal & External Temperature	Temperature (Celcius)	2 Byte	CRTU
This object provides to measure at which ratio the actual internal temperature with external and internal sensors, via connected to the related group address.			
Internal Temperature Threshold 1	1 – True / 0 – False	1 bit	CRTU
This object provides the use of the first internal threshold value, via connected to the related group address.			
Internal Temperature Threshold 2	1 – True / 0 – False	1 bit	CRTU
This object provides the use of the second internal threshold value, via connected to the related group address.			

5.4. Room Controller Page

All configurations related to air conditioning control on the iSwitch are described in the sections of this chapter. This parameter page will be shown when it is enabled at the “General” parameter page section. The information about the “General” parameter configuration section is described after the theoretical control type expressions that are given below.

5.4.1. Control Types Theoretical Explanations

The room controller device can be used for only heating, only cooling or heating and cooling. If the room controller is on heating and cooling mode, the transition from heating to cooling or vice versa can occur automatically. The thermostat measures the actual temperature of the ambient air and continuously compares it to the set temperature, and the controller automatically calculates whether to send a control signal for heating or cooling.

The control algorithm based on the difference between the desired setpoint temperature values and the measured actual temperature values processes a command value that can be either percentage or On / Off. The command, periodically or depending on the event, is transmitted to a KNX actuator device via bus line with communication objects.

5.4.1.1. 2-Points Control

This control algorithm, also known as On / Off, is the most classic and popular one. The algorithm follows a hysteresis cycle, allowing the system to switch On / Off. Hence, 2 switching levels are considered for switching.

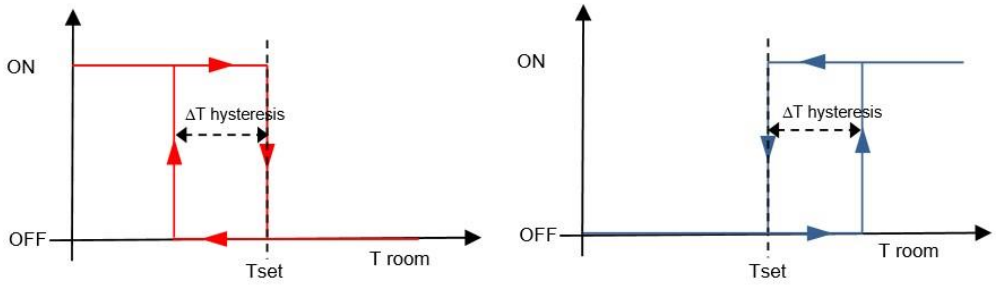


Fig. 20 : 2 – Points Control Hysteresis Cycle

Heating mode

When the measured temperature is lower than the difference between the setpoint and the hysteresis value($T_{setpoint} - \Delta T_{hysteresis}$), the device activates the heating system by sending the KNX command to the actuator that controls the heating system via connected to a related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the heating system. In this way, there are 2 decision thresholds to activate and deactivate the heating system. The first one is the

temperature that the device activates the system($T_{setpoint} - \Delta T_{hysteresis}$), the second one is the temperature that the device deactivates the heating system($T_{setpoint}$).

Cooling mode

When the measured temperature is higher than the difference between the setpoint and the hysteresis value($T_{setpoint} - \Delta T_{hysteresis}$), the device activates the heating system by sending the KNX command to the actuator that controls the cooling system via connected to a related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the cooling system. In this way, there are 2 decision thresholds to activate and deactivate the cooling system. The first one is the temperature that the device activates the system($T_{setpoint} + \Delta T_{hysteresis}$), the second one is the temperature that the device deactivates the heating system($T_{setpoint}$).

There are 2 different parameters for heating and cooling hysteresis values at the ETS programme. Values differ depending on the system type.

5.4.1.2. PWM Control

The PWM (Pulse Width Modulation) proportional-integral controller allows the digital output to be set to On and Off by sampling an analogue control variable within a specified period. The controller runs periodically through a cycle and keeps its output ON for each period in proportion to the value of the control variable. As shown in the below figure, by varying the ratio between the “ON” time and the “OFF” time, the average activation time of the output changes, and as a result the average heating or cooling power supplied by the room changes.

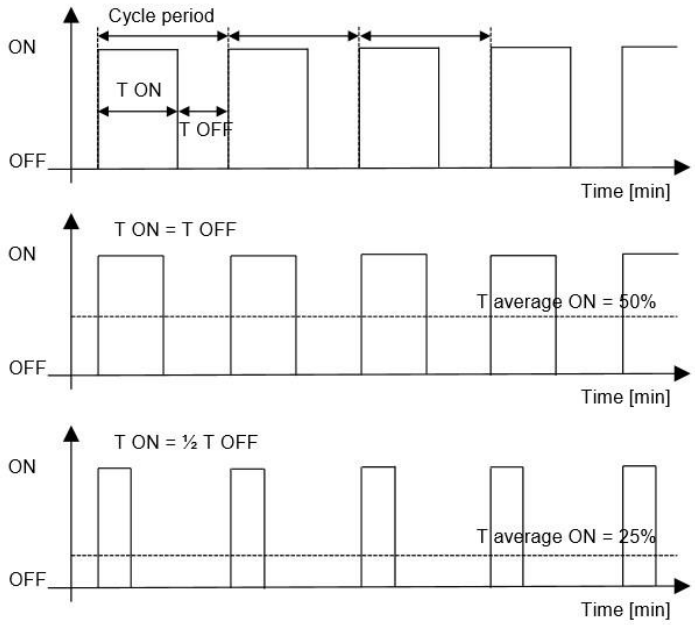


Fig. 21 : PWM Control Sampling

This type of control is well suited for use with ON / OFF actuators, such as electrothermal actuators and drives for zone valves, which are less expensive than proportional actuators.

A distinctive advantage of this type of control is that it eliminates the inertia of the system: it allows significant energy savings because unnecessary interventions on the system introduced by the 2-point control with hysteresis are avoided and only the power is required to compensate the losses.

Every time the changes the desired temperature setpoint, the cycle time is interrupted, the control output is reprocessed and the PWM restarts with a new cycle: this allows the system to reach it's steady-state more quickly.

5.4.1.3. Continuous (PI) Control

Proportional – Integral control (PI control) is explained by the relationship shown below:

$$control\ variable(t) = Kp \times error(t) + Ki \times \int error(\tau)d\tau\ t\ 0$$

$$error(t) = (Setpoint - Measured\ temperature)\ in\ heating$$

$$error(t) = (Measured\ temperature - Setpoint)\ in\ cooling$$

$$Kp = proportional\ constant$$

$$Ki = integral\ constant$$

The control variable contains integral and proportional (Ki and Kp) constants to eliminate errors. In practice, intuitively generated values are generally used.

Ex 1 :

$Proportional\ band\ BP\ [K] = 100 / Kp$ $\qquad$ $Integral\ time\ Ti\ [min] = Kp / Ki$

The proportional band is the error value that determines the maximum deflection output as 100%.

For example, a regulator with a proportional band of 5 K provides a 100% control output when the Setpoint = 20°C and the measured temperature is ≤ 15°C in heating; in the cooling conduction mode, it provides a 100% control output when the Setpoint = 24°C and the measured temperature is ≥ 29°C. As shown in the figure, a regulator with a small proportional band tends to provide higher values of the control variable for small errors than a regulator with a higher proportional band.

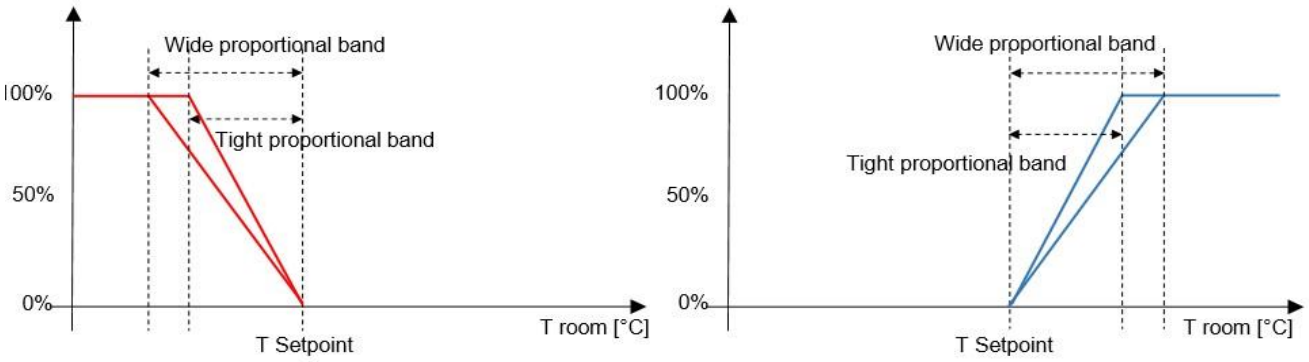


Fig. 22 : Continuous PI Control Proportional Band Widths

The integral time is the time required to repeat the value of the control variable of a purely proportional regulator when the error remains constant in time.

Ex 2 :

For example, with a purely proportional controller in heating and with a value of proportional band of 4 K, if the setpoint is = 20°C and the measured temperature is = 18°C, the control variable assumes the value of 50%. With an integral time = 60 minutes, if the error remains constant, the control variable will take the value = 100% after 1 hour, i.e. a contribution equal to the value given by only proportional contribution will be added to the control variable.

In heating and air conditioning systems, a purely proportional controller is not able to guarantee the achievement of the setpoint. You should always introduce an integrated action for achieving the Setpoint: that is why the integral action is also called automatic reset.

5.4.2. General

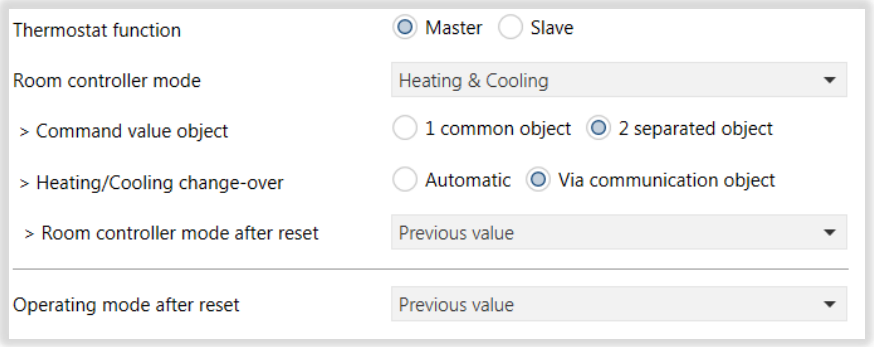


Fig. 23 : Room Controller General Configuration Section

The thermostat function can be selected as the “master” controller or “slave” controller in the configuration settings in this section. When the selection is made as to the “master” controller, configuration sections and 14 bytes “master room controller” communication objects are opened to define the thermostat functions. When the selection is made as to the “slave” controller, the configuration sections related to the thermostat functions are closed. The slave controller must be connected to the master controller with the KNX communication object as it will operate as a dependent controller with a 14-byte “slave room controller” object. Heating, cooling, heating and cooling operation mode selections, manual or automatic selection of mode switching and the operation of the room controller after a power failure can be set from this section.

5.4.2.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
Thermostat function	The thermostat function's operating type is determined with this parameter.	**Master** Slave
Room controller mode	Room controller mode is determined with this parameter.	**Heating** Cooling Heating & Cooling
Command value object[*1]	The object types of temperature command values for heating and cooling mode is determined with this parameter.	**1 common object** 2 separated object
Heating / Cooling change–over[*1]	This parameter determines how the heating/cooling transition is made.	**Automatic** Via communication object
Room controller mode after reset	This parameter determines the room controller mode after the device restarts.	**Previous value** Heating Cooling
Operating mode after reset	This parameter determines the operating mode of the room controller after a reset occurs. Ex : When a power failure occurs.	**Previous value** Comfort Standby Night Building protection

5.4.2.2. Objects List

Object Name	Function	Type	Flags
Master Room Controller	Master/Slave Communication	14 byte	CRWTU
This object determines which device is the main controller.			
Slave Room Controller	Master/Slave Communication	14 byte	CRWTU
This object is used to determine the slave room controller devices.			
Operating Mode Switch – Over	1 – Comfort; 2 – Standby; 3 – Night; 4 – Building Protection	1 byte	CRWTU
This object switches over the operating modes with a 1-byte value.			
Operating Mode Status	1 – Comfort; 2 – Standby; 3 – Night; 4 – Building Protection	1 byte	CRTU
This object indicates the status of the operating mode with a 1-byte value.			
Comfort Mode	1 – Set Mode, 0 – Nothing	1 bit	CRWTU
The comfort mode activation command is sent via this object.			
Standby Mode	1 – Set Mode, 0 – Nothing	1 bit	CRWTU
The standby mode activation command is sent via this object.			
Night Mode	1 – Set Mode, 0 – Nothing	1 bit	CRWTU
The night mode activation command is sent via this object.			
Buiding Protection	1 – Set Mode, 0 – Nothing	1 bit	CRWTU
The building protection mode activation command is sent via this object.			

5.4.3. Heating

The device's operation principle of heating feature is as follows: When the measured temperature is lower than the setpoint temperature, the device activates the heating system by sending a KNX command to the actuator that controls the heating system via connected to the related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the heating system. The heating feature can be controlled with different types of configuration settings. These configuration settings are as follows ;

Selection of the "Heating 2 – Points Control" parameter, 1 bit on/off control.

Selection of the "Heating Pwm Control" parameter, 1-byte proportional-integral control.

Selection of the "Heating Continuous Control" parameter, 1-byte proportional-integral control.

5.4.3.1. Heating 2 – Points Control

When the measured temperature is lower than the difference between the setpoint and the hysteresis value($T_{setpoint} - \Delta T_{hysteresis}$), the device activates the heating system by sending a KNX command to the actuator that controls the heating system via connected to a related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the heating system. In this way, there are 2 decision thresholds to activate and deactivate the heating system. The first one is the temperature that the device activates the system($T_{setpoint} - \Delta T_{hysteresis}$), the second one is the temperature that the device deactivates the heating system($T_{setpoint}$).

Fig. 24 : Heating 2-Points Control Configuration

5.4.3.2. Parameters List

PARAMETER	DESCRIPTION	VALUES
Heating control type	This parameter determines the heating control type.	**2 – points** PWM Continuous
Hysteresis	This parameter determines the hysteresis value.	**0.5 K** (0.1K…2.0K)
Sending of command value periodically (min)	This parameter determines the time of command value to be sent periodically.	**0** (0…100)
Send indication of heat required	This parameter sends status information about whether the heating system is working.	**No** Yes

5.4.3.3. Objects List

Object Name	Function	Type	Flags
Command Value for Heating (2 – points)	1 – On / 0 – Off	1 bit	CRTU
This object controls the heating system by 2 – points control method with 1-byte data as ON / OFF control.			
Heat Requirement Indication (2 – points)	Status	1 bit	CRTU
This object sends the actual status information of the 2-Points controlled heating.			

5.4.3.4. Heating PWM Control

The PWM (Pulse Width Modulation) proportional-integral controller allows the digital output to be set to On and Off by sampling an analogue control variable within a specified period. The controller runs periodically through a cycle and keeps its output ON for each period in proportion to the value of the control variable. By varying the ratio between the “ON” time and the “OFF” time of the heating system, the average activation time of the output changes, and as a result, the average heating power supplied by the room changes.

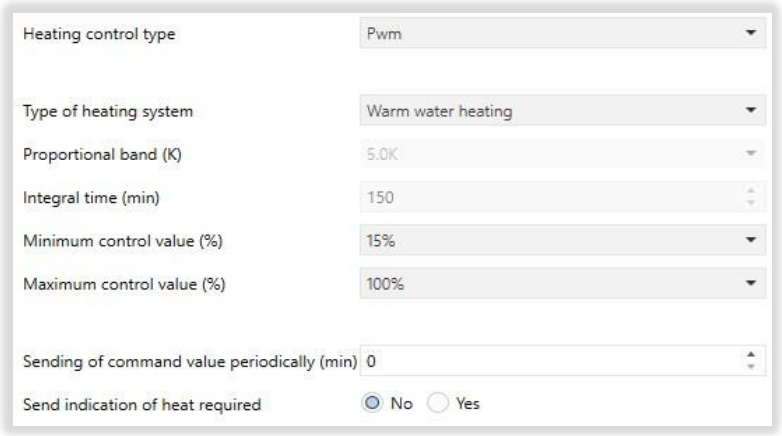


Fig. 25 : Heating PWM Control Configuration

5.4.3.5. Parameters List

PARAMETER	DESCRIPTION	VALUES
Type of heating system	This parameter determines the heating system to be controlled.	**Warm water heating** Electric heating Floor heating Split unit Fan coil User customise
Proportional band (K)	This parameter determines the proportional band.	**5.0K** (0.5K…10.0K)
Integral time (min)	This parameter determines the integral time.	**150** (0…255)
Minimum control value (%)	This parameter determines the output object's minimum control value.	**0%** (0%, 5%, 10%, 15%, 20%, 25%, 30%)
Maximum control value (%)	This parameter determines the output object's maximum control value.	**100%** (70%, 75%, 80%, 85%, 90%, %95, 100%)
PWM cycle time (min)	This parameter determines the PWM cycle time.	**15** (0…255)
Sending of the command value **periodically (min)**	This parameter determines the period of command value to be sent periodically.	**0** (0…100)
Send indication of heat required	This parameter sends status information about whether the heating system is working.	**No** Yes

5.4.3.6. Objects List

Object Name	Function	Type	Flags
Command for Heating Value (Pwm)	1 – On / 0 – Off	1 bit	CRTU
This object controls the heating system by PWM control method with 1-bit data.			
Command for Heating Value (Pwm)	0% – 100%	1 byte	CRTU
This object controls the heating system by PWM control method with 1-byte data.			
Heat Requirement Indication	1 – True / 0 – False	1 bit	CRTU
This object sends the actual status information of the PWM controlled heating.			

5.4.3.7. Heating Continuous Control

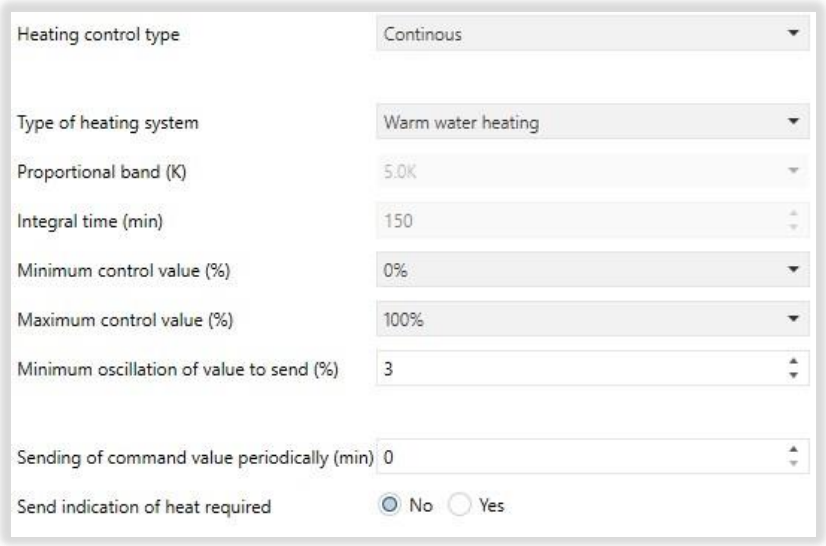


Fig. 26 : Heating Continuous Control Configuration

Proportional – Integral control (PI control) is explained by the relationship shown below:

$$control\ variable(t) = Kp \times error(t) + Ki \times \int error(\tau)d\tau\ t\ \mathbf{0}$$

$$error(t) = (Setpoint - Measured\ temperature)\ in\ heating$$

$$error(t) = (Measured\ temperature - Setpoint)\ in\ cooling$$

$$Kp = proportional\ constant$$

$$Ki = integral\ constant$$

The control variable contains integral and proportional (Ki and Kp) constants to eliminate errors. In practice, intuitively generated values are generally used.

$$Proportional\ band\ BP\ [K] = 100 / Kp \quad , \quad Integral\ time\ Ti\ [min] = Kp / Ki$$

The proportional band is the error value that determines the maximum deflection output as 100%.

5.4.3.8. Parameters List

PARAMETER	DESCRIPTION	VALUES
Type of heating system	This parameter determines the heating system to be controlled.	**Warm water heating** Electric heating Floor heating Split unit Fan coil User customise
Proportional band (K)	This parameter determines the proportional band.	**5.0K** (0.5K … 10.0K)
Integral time (min)	This parameter determines the integral time.	**150** (0 … 255)
Minimum control value (%)	This parameter determines the output object's minimum control value.	**0%** (0%, 5%, 10%, 15%, 20%, 25%, 30%)
Maximum control value (%)	This parameter determines the output object's maximum control value.	**100%** (70%, 75%, 80%, 85%, 90%, 95%, 100%)
Minimum oscillation of value to send (%)	This parameter determines the minimum oscillation value for the output object to send a value.	**3** (0…100)
Sending of command value periodically (min)	This parameter determines the time of command value to be sent periodically.	**0** (0…255)
Send indication of heat required	This parameter sends status information about whether the heating system is working.	**No** Yes

5.4.3.9. Objects List

Object Name	Function	Type	Flags
Command Value for Heating (Continuous)	0% – 100%	1 byte	CRTU
This object controls the continuous PI controlled heating system with 1-byte data.			
Heat Requirement Indication	1 – True / 0 – False	1 bit	CRTU
This parameter sends status information that the heating system is active or deactivated.			

5.4.3.10. Additional Heating System

All types of heating controls(2-points, PWM and continuous control) have additional heating system options. The additional heating system works in all control types with the same characteristics. It controls the heating system with the hysteresis method. The system activates itself according to the offset and hysteresis configuration. In addition, after a power failure, the additional system retains its selected value which is selected from the Disabling additional heating parameter(Disabled or Enabled). Besides, there are 2 control type objects these are; switching(1bit) and continuous(1 byte). The continuous one is designed for compatibility with other heating systems.

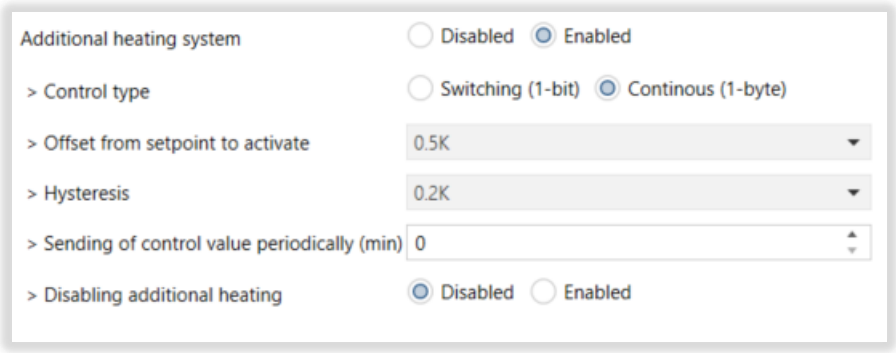


Fig. 27 : Additional Heating System Configuration

5.4.3.11. Parameters List

PARAMETER	DESCRIPTION	VALUES
Additional heating system	This parameter activates the additional heating system.	**Disabled** Enabled
Control type	This parameter determines the additional heating system's control object type.	**Switching (1 – bit)** Continuous (1 – byte)
Offset from setpoint to activate*	This parameter determines the difference between the setpoint temperature value and the additional heating system's setpoint temperature value.	**0.5K,** 1.0K, 1.5K, 2.0K, 2.5K, 3.0K, 3,5K, 4.0K, 5.0K
Hysteresis	This parameter determines the hysteresis value.	**0.2K,** 0.3K, 0.4K, 0.5K, 0.6K, 0.7K, 0.8K, 0.9K, 1.0K, 1.2K, 1.3K, 0.4K, 1.5K, 1.6K, 1.7K, 1.8K, 1.9K, 2.0K
Sending of control value periodically (min)*[1]	This parameter determines the time of control value to be sent periodically.	**0** (0…255)
Disabling additional heating	This parameter allows the additional heating system to be active or passive via the KNX bus line.	**Disabled** Enabled

5.4.3.12. Objects List

Object Name	Function	Type	Flags
Control of Additional Heating	1 – On / 0 – Off	1 bit	CRTU
This object controls the additional heating system with 1-bit data.			
Control of Additional Heating	0% – 100%	1 byte	CRTU
This object controls the additional heating system with 1-byte data.			
Disable Additional Heating	0 – Disable / 1 – Enable	1 bit	CRWTU
This object activates or deactivates the additional heating system.			

5.4.4. Cooling

The device's operation principle of cooling feature is as follows: When the measured temperature is higher than the setpoint temperature, the device activates the cooling system by sending a KNX command to the actuator that controls the cooling system via connected to the related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the cooling system. The cooling feature can be controlled with different types of configuration settings. These configuration settings are as follows ;

Selection of the "Heating 2 – Points Control" parameter, 1 bit on/off control.

Selection of the "Heating Pwm Control" parameter, 1-byte proportional-integral control.

Selection of the "Heating Continuous Control" parameter, 1-byte proportional-integral control.

5.4.4.1. Cooling 2 – Points Control

When the measured temperature is higher than the difference between the setpoint and the hysteresis value($T_{setpoint} + \Delta T_{hysteresis}$), the device activates the cooling system by sending a KNX command to the actuator that controls the cooling system via connected to a related group address. When the measured temperature reaches the setpoint temperature, the device sends a related command and deactivates the cooling system. In this way, there are 2 decision thresholds to activate and deactivate the cooling system. The first one is the temperature that the device activates the cooling system($T_{setpoint} + \Delta T_{hysteresis}$), the second one is the temperature that the device deactivates the cooling system($T_{setpoint}$).

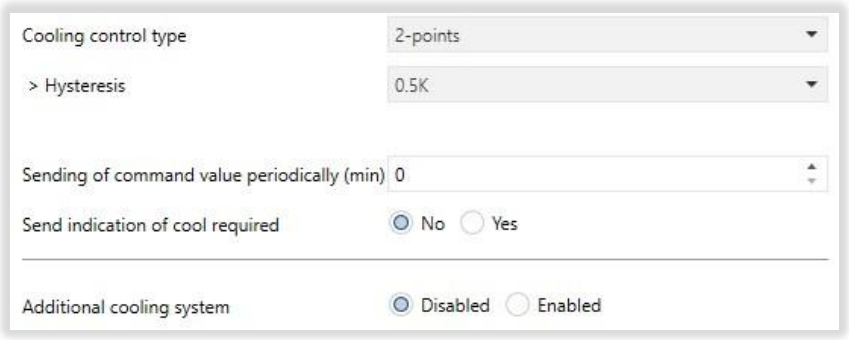


Fig. 28 : Cooling 2-Points Control Configuration

5.4.4.2. Parameters List

PARAMETER	DESCRIPTION	VALUES
Cooling control type	This parameter determines the cooling control type.	**2 – points** PWM Continuous
Hysteresis	This parameter determines the hysteresis value.	**0.5K** (0.1K…2.0K)
Sending of command value periodically (min)	This parameter determines the time of command value to be sent periodically.	**0** (0…100)
Send indication of cool required	This parameter sends status information about whether the cooling system is working.	**No** Yes

5.4.4.3. Objects List

Object Name	Function	Type	Flags
Command Value for Cooling (2 – points)	1 – On / 0 – Off	1 bit	CRTU
This object controls the cooling system by 2 – points control method with 1-byte data as ON / OFF control.			
Cool Requirement Indication	Status	1 bit	CRTU
This object sends the actual status information of the 2-Points controlled cooling.			

5.4.4.4. Cooling Pwm Control

The PWM (Pulse Width Modulation) proportional-integral controller allows the digital output to be set to On and Off by sampling an analogue control variable within a specified time. The controller runs periodically through a cycle and keeps its output ON for each period in proportion to the value of the control variable. By varying the ratio between the “ON” time and the “OFF” time of the heating system, the average activation time of the output changes, and as a result, the average heating power supplied by the room changes.

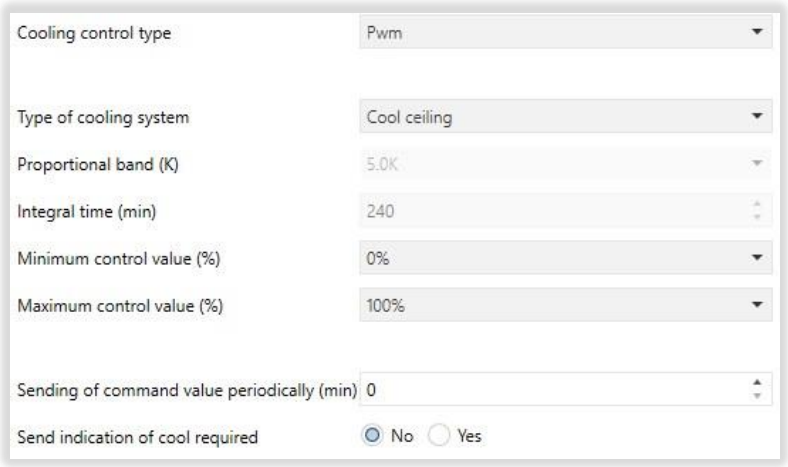


Fig. 29 : Cooling PWM Control Configuration

5.4.4.5. Parameters List

PARAMETER	DESCRIPTION	VALUE
Type of cooling system	This parameter determines the cooling system to be controlled.	**Cool ceiling** Split unit Fan coil User customize
Proportional band (K)	This parameter determines the proportional band.	**5.0K** (0.5K…10.0K)
Integral time (min)	This parameter determines the integral time.	**240** (0…255)
Minimum control value (%)	This parameter determines the output object's minimum control value.	**0%** (0%, 5%, 10%, 15%, 20%, 25%, 30%)
Maximum control value (%)	This parameter determines the output object's maximum control value.	**100%** (70%, 75%, 80%, 85%, 90%, 95%, 100%)
PWM cycle time (min)	This parameter determines the PWM cycle time.	**15** (0…255)
Sending of command value periodically (min)	This parameter determines the time of command value to be sent periodically.	**0** (0…100)
Send indication of cool required	This parameter sends status information about whether the cooling system is working.	**No** Yes

5.4.4.6. Objects List

Object Name	Function	Type	Flags
Command Value for Cooling (Pwm)	1 – On / 0 – Off	1 bit	CRTU
This object controls the cooling system by PWM control method with 1-bit data.			
Command Value for Cooling (Pwm)	0% – 100%	1 byte	CRTU
This object controls the cooling system by PWM control method with 1-byte data.			
Cool Requirement Indication	1 – True / 0 – False	1 bit	CRTU
This object sends the actual status information of the PWM controlled cooling.			

5.4.4.7. Cooling Continuous Control

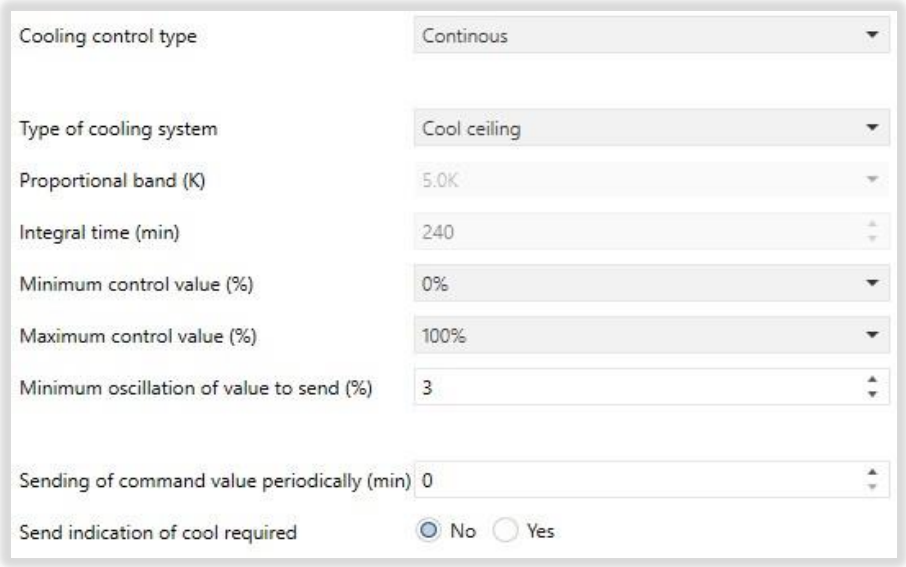


Fig. 30 : Cooling Continuous Control Configuration

Proportional – Integral control (PI control) is explained by the relationship shown below:

$$control\ variable(t) = Kp \times error(t) + Ki \times \int error(\tau)d\tau\ t\ \mathbf{0}$$

$$error(t) = (Setpoint - Measured\ temperature)\ in\ heating$$

$$error(t) = (Measured\ temperature - Setpoint)\ in\ cooling$$

$$Kp = proportional\ constant$$

$$Ki = integral\ constant$$

The control variable contains integral and proportional (Ki and Kp) constants to eliminate errors. In practice, intuitively generated values are generally used.

$$Proportional\ band\ BP\ [K] = 100 / Kp \quad , \quad Integral\ time\ Ti\ [min] = Kp / Ki$$

The proportional band is the error value that determines the maximum deflection output as 100%.

5.4.4.8. Parameters List

PARAMETER	DESCRIPTION	VALUES
Type of cooling system	This parameter determines the cooling system to be controlled.	**Cooling ceiling** Split unit Fan coil User customize
Proportional band (K)	This parameter determines the proportional band.	**5.0K** (0.5K…10.0K)
Integral time (min)	This parameter determines the integral time.	**240** (0…255)
Minimum control value (%)	This parameter determines the output object's minimum control value.	**0%** (0%, 5%, 10%, 15%, 20%, 25%, 30%)
Maximum control value (%)	This parameter determines the output object's maximum control value.	**100%** (70%, 75%, 80%, 85%, 90%, 95%, 100%)
Minimum oscillation of value to send (%)	This parameter determines the minimum oscillation value for the output object to send a value.	**3** (0…100)
Sending of command value periodically (min)	This parameter determines the time of command value to be sent periodically.	**0** (0…255)
Send indication of cool required	This parameter sends status information about whether the cooling system is working.	**No** Yes

5.4.4.9. Objects List

Object Name	Function	Type	Flags
Command Value for Cooling (Continuous)	0% – 100%	1 byte	CRTU
This object controls the continuous PI controlled cooling system with 1-byte data.			
Cool Requirement Indication	1 – True / 0 – False	1 bit	CRTU
This parameter sends status information that the cooling system is active or deactivated.			

5.4.4.10. Additional Cooling System

All types of cooling controls(2-points, PWM and continuous control) have additional cooling system options. The additional cooling system works in all control types with the same characteristics. It controls the cooling system with the hysteresis method. The system activates itself according to the offset and hysteresis configuration. In addition, after a power failure, the additional system retains its selected value which is selected from the “Disabling additional cooling” parameter(Disabled or Enabled). Besides, there are 2 control type objects these are; switching(1bit) and continuous(1 byte). The continuous one is designed for compatibility with other cooling systems.

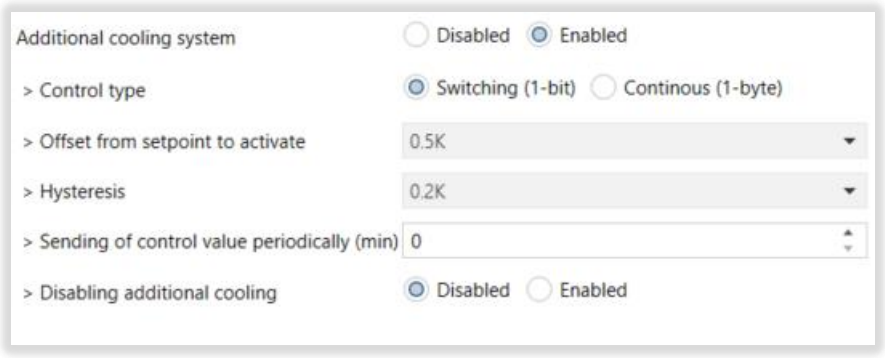


Fig. 31 : Additional Cooling System Configuration

5.4.4.11. Parameters List

PARAMETER	DESCRIPTION	VALUE
Additional Cooling system	This parameter activates the additional cooling system.	**Disabled** Enabled
Control type	This parameter determines the additional cooling system's control object type.	**Switching (1 – bit)** Continuous (1 – byte)
Offset from setpoint to activate	This parameter determines the difference between the setpoint temperature value and the additional cooling system's setpoint temperature value.	**0.5K,** 1.0K, 1.5K, 2.0K, 2.5K, 3.0K, 3,5K, 4.0K, 5.0K
Hysteresis	This parameter determines the hysteresis value.	**0.2K,** 0.3K, 0.4K, 0.5K, 0.6K, 0.7K, 0.8K, 0.9K, 1.0K, 1.2K, 1.3K, 0.4K, 1.5K, 1.6K, 1.7K, 1.8K, 1.9K, 2.0K,
Sending of control value periodically (min)	This parameter determines the time of control value to be sent periodically.	**0** (0…255)
Disabling additional cooling	This parameter allows the additional cooling system to be active or passive via the KNX bus line.	**Disabled** Enabled

5.4.4.12. Objects List

Object Name	Function	Type	Flags
Control of Additional Cooling	1 – On / 0 – Off	1 bit	CRTU
This object controls the additional cooling system with 1-bit data.			
Control of Additional Cooling	0% – 100%	1 byte	CRTU
This object controls the additional cooling system with 1-byte data.			
Disable Additional Cooling	0 – Disable / 1 – Enable	1 bit	CRWTU
This object activates or deactivates the additional cooling system.			

5.4.5. Heating & Cooling

Heating & Cooling mode is generally used when there are 2 different heating and cooling sources or only 1 source that has both heating and cooling ability together. If the heating/cooling sources are different, the command value object parameter should be selected as “2 separated objects”. However, if heating and cooling are obtained from the same source, the command value object parameter should be selected as “1 common object”. Additionally, in this mode, the distinction is made whether the switch-over between heating and cooling is to be effected automatically or in a controlled way through the communication object.

In automatic switch-over option: for the heating, the controller will turn on the heating when the room temperature has fallen below a preset dead band limit. As soon as the room temperature is exceeding the heating setpoint, the control will turn off the heating in the heating & cooling mode. For the cooling, the controller will turn on the cooling system when the room temperature has exceeded a preset dead band limit. As soon as the room temperature is reaching above the cooling setpoint, the control will turn off the cooling system in the heating & cooling mode.

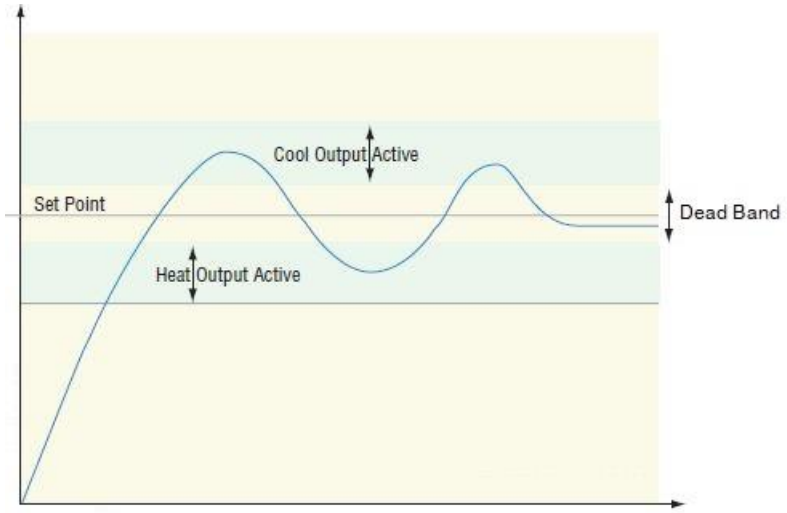


Fig. 32 : Heating & Cooling Mode Dead Band

In via communication object option: In this option, there is no dead band concept compared to the automatic option. The main difference between automatic and communication object options; the mode switch-over between modes is made manually.

5.4.5.1. Parameters List

In heating & cooling mode, cooling configurations and heating configurations can be made separately mentioned before. In this section, only extra parameters for this mode are described below.

PARAMETER	DESCRIPTION	VALUES
Thermostat function	The thermostat function's operating type is determined with this parameter.	**Master** Slave
Room controller mode	Room controller mode is determined with this parameter.	**Heating** Cooling Heating & Cooling
Command value object[*1]	The object types of temperature command values for heating and cooling mode is determined with this parameter.	**1 common object** 2 separated object
Heating / Cooling change–over[*1]	This parameter determines how the heating/cooling transition is made.	**Automatic** Via communication object
Room controller mode after reset	This parameter determines the room controller mode after the device restarts.	**Previous value** Heating Cooling

5.4.5.2. Objects List

In heating & cooling mode, cooling configurations and heating configurations can be made separately mentioned before. In this section, only extra objects for this mode are described below.

Object Name	Function	Type	Flags
Heating / Cooling Change – Over	1 – Heat; 0 – Cool	1 bit	CRWTU
This object is used to change over the heating/cooling modes.			
Heating / Cooling Status	1 – Heat; 0 – Cool	1 bit	CRTU
Heating/cooling status information is indicated via this object.			
Command Value for Heating and Cooling (2 – points)	1 – On / 0 – Off	1 bit	CRTU
This object sends commands for the heating and cooling modes by 2 – points on/off control method with 1-bit data.			
Command Value for Heating and Cooling (PWM)	1 – On / 0 – Off	1 bit	CRTU
This object sends commands for the heating and cooling modes by pulse width modulation(PWM) control method with 1-bit data.			
Command Value for Heating and Cooling (Continuous)	0% – 100%	1 byte	CRTU
This object sends commands for the heating and cooling modes by the continuous control method with 1-byte data.			
Command Value for Heating (2 – points)	1 – On / 0 – Off	1 bit	CRTU
This object controls the heating system by 2 – points control method with 1-byte data as ON / OFF control.			
Command for Heating Value (Pwm)	1 – On / 0 – Off	1 bit	CRTU
This object controls the heating system by PWM control method with 1-bit data.			
Command for Heating Value (Pwm)	0% – 100%	1 byte	CRTU
This object controls the heating system by PWM control method with 1-byte data.			

Command Value for Heating (Continuous)	0% – 100%	1 byte	CRTU
This object controls the continuous PI controlled heating system with 1-byte data.			
Command Value for Cooling (2 – points)	1 – On / 0 – Off	1 bit	CRTU
This object controls the cooling system by 2 – points control method with 1-byte data as ON / OFF control.			
Command Value for Cooling (Pwm)	1 – On / 0 – Off	1 bit	CRTU
This object controls the cooling system by PWM control method with 1-bit data.			
Command Value for Cooling (Pwm)	0% – 100%	1 byte	CRTU
This object controls the cooling system by PWM control method with 1-byte data.			
Command Value for Cooling (Continuous)	0% – 100%	1 byte	CRTU
This object controls the continuous PI controlled cooling system with 1-byte data.			

5.4.6. Set Points

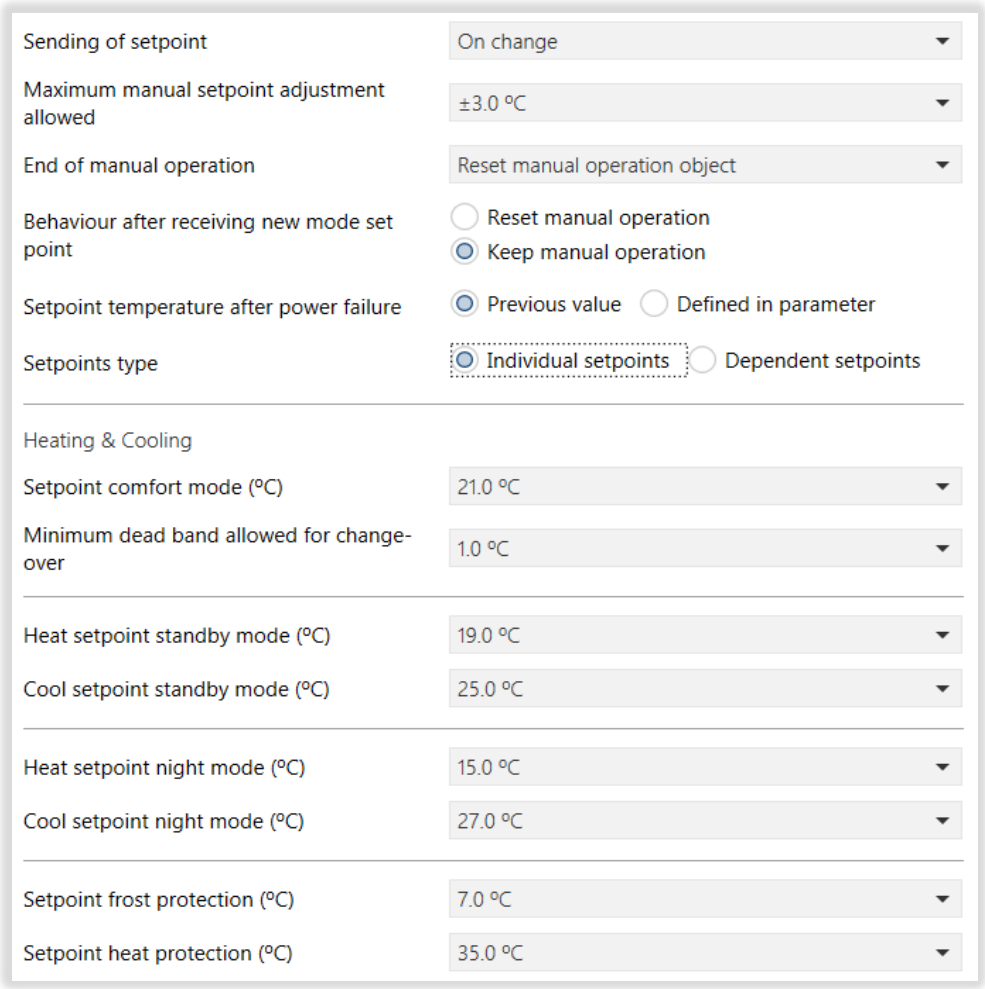


Fig. 33 : Set Points Configuration

Temperature setpoints for heating or cooling modes are configured in this section. The operation modes such as comfort, standby, night and frost protection of “heating”, “cooling” and “heating & cooling” modes can be separately specified from this section. The temperature setpoint value can be configured to send to KNX bus line with 3 different settings such as “Periodically”, “On change” and “Periodically and on change”. Besides, how much the maximum bandwidth setting will be configured for that increasing or decreasing the temperature value manually can be determined. Moreover, it is possible to set which setpoint values will be used when there is a power failure.

5.4.6.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
Sending of setpoint	This parameter allows sending the setpoint temperature value information. **On change :** The Temperature value information is sent when the setpoint temperature value changed 1 K. **Periodically :** The Temperature value information is sent periodically. **Periodically and on change :** The Temperature value information is sent periodically or when the setpoint temperature value changed 1 K.	**On change** Periodically Periodically and on change
Period of sending (min)*[1]	This parameter determines the time of setpoint temperature value to be sent periodically.	**5** (0…255)
Maximum manual setpoint adjustment allowed	This parameter configures the maximum and minimum limit values for the setpoint temperature value.	**+ / – 3.0˚C** (**+ / – 1 ˚C… + / – 10.0 ˚C**)
End of manual operation	This parameter determines the time to end manual operation. This parameter determines the behaviour after receiving the new set mode.	**Reset manual operation object** 30 min, 1hr, 2hr, 3hr, 4hr, 6hr, 9hr, 12hr, 15hr, 18hr, 25hr
Behaviour after receiving new mode set	This parameter determines the behaviour after receiving the new set mode. **Reset manual operation :** The manual operation is reset after the new setting mode is received with this option. **Keep manual operation :** The manual operation is continued after the new setting mode is received with this option.	**Reset manual operation** Keep manual operation
Setpoint temperature after power failure	This parameter determines the setpoint temperature after a power failure.	**Previous value** Defined in parameter
Setpoints type	The desired temperature value can be controlled with individual or dependent setpoints by this parameter.	**Individual setpoints** Dependent setpoints
Setpoint comfort mode (˚C)	The desired temperature value for comfort mode is configured with this parameter.	**21.0˚C** (10.0˚C…35.0˚C)

Setpoint standby mode (˚C)	The desired temperature value for standby mode is configured with this parameter.	**19.0˚C** (10.0˚C…35.0˚C)
Setpoint night mode (˚C)	The desired temperature value for night mode is configured with this parameter.	**15.0˚C** (10.0˚C…35.0˚C)
Setpoint frost protection (˚C)	The desired temperature value for frost protection mode is configured with this parameter.	**7.0˚C** (10.0˚C…35.0˚C)
Setpoint heat protection (˚C)	The desired temperature value for heat protection mode is configured with this parameter.	**35.0˚C** (10.0˚C…35.0˚C)
Minimum dead band allowed for change – over	When the heating/cooling change–over is configured in automatic mode, the dead bandwidth is can be set with this parameter.	**1.0˚C** (0.5˚C…7.0˚C)

5.4.6.2. Objects List

Object Name	Function	Type	Flags
Actual Setpoint Temperature	Temperature (Celcius)	2 byte	CRTU
The pre-configured setpoint temperature is obtained with this object.			
Set Manual Setpoint	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature is configured manually with this object.			
Reset Manual Setpoint Operation	1 – True / 0 – False	1 bit	CRWTU
The setpoint temperature that is desired to configure manually can be reset with this object.			
Setpoint for Comfort	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for comfort mode is configured with this object.			
Setpoint for Heating Standby	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for heating standby mode is configured with this object.			
Setpoint for Heating Night	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for heating night mode is configured with this parameter.			
Setpoint for Cooling Standby	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for cooling standby mode is configured with this parameter.			
Setpoint for Cooling Night	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for cooling night mode is configured with this parameter.			
Setpoint for Heat Protection	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for heat protection mode is configured with this parameter.			
Setpoint for Frost Protection	Temperature (Celcius)	2 byte	CRWTU
The setpoint temperature value for frost protection mode is configured with this parameter.			

5.4.7. Fan

This section contains information about the usage of the “Fan Indicator” and “Fan Controller” sections.

5.4.7.1. Fan Indicator

When the parameter “Fan control available” is set to “Enabled” for fan control at the “GENERAL” parameter page, a new subtitle is generated named “Fan Indicator” inside the LCD parameter page. In this section it is possible to make configurations such as the number of fan levels (from 1 to 5) that can be configured, fan level indicator data type can be determined, fan operating speeds to work according to which limits. Above, The opening page is shown only when the parameter “Fan control available” is set to “Enabled. Additionally, the fan indicator is used only for visualization of the status information on the LCD screen.

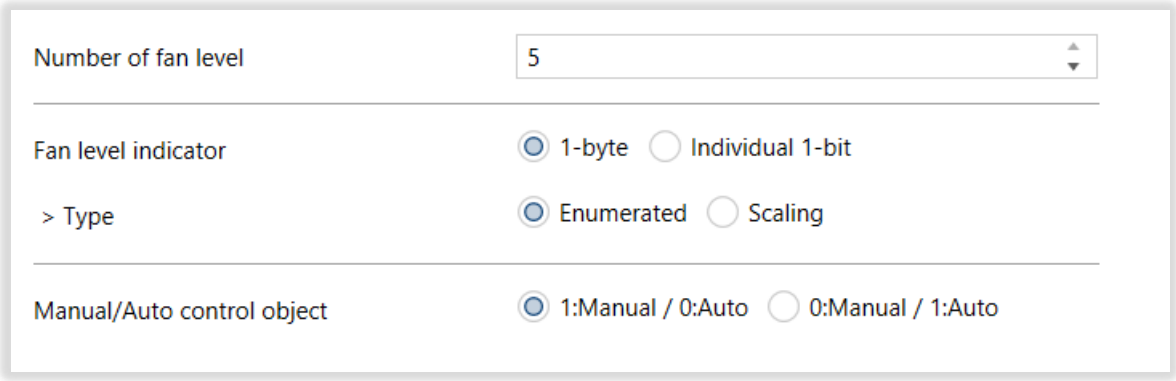


Fig. 34 : Fan Indicator Configuration

5.4.7.2. Parameters List

PARAMETER	DESCRIPTION	VALUES
Number of fan level	The number of fan levels is determined with this parameter.	**3** (1…5)
Fan level indicator	This parameter determines the fan level indicator data type.	**1-byte** Individual 1-bit
Type	This parameter determines the fan level indicator visualization method.	Enumerated **Scaling**
Fan level 1 lower limit	The lower limit value of the 1st speed is determined with this parameter.	**1** (1…100)
Fan level 2 lower limit*[1]	The lower limit value of the 2nd speed is determined with this parameter.	**30** (1…100)
Fan level 3 lower limit*[1]	The lower limit value of the 3rd speed is determined with this parameter.	**70** (1…100)
Manual / Auto control object	Manual or automatic fan speed control is selected with this parameter.	**1 : Manual / 0 : Auto** 0 : Manual / 1 : Auto

*[1] These parameters are only visible according to the selected “Number of fan level” parameter value.

5.4.7.3. Objects List

Object Name	Function	Type	Flags
Fan Indicator Scaling	0 – OFF; 1 – Speed 1; 2 – Speed 2; 3 – Speed 3; 4 – Speed 4; 5 – Speed 5	1 byte	CRWTU
This object is used for the fan speed to be displayed on the screen. Fan levels configured to specific limits are displayed on the screen. 5 different fan speed levels can be displayed.			
Fan Indicator Enumerated	0 – OFF; 1 – Speed 1; 2 – Speed 2; 3 – Speed 3; 4 – Speed 4; 5 – Speed 5	1 byte	CRWTU
This object is used for the fan speed to be displayed on the screen. When the value of 1 is sent fan level is 1, the value of 2 is sent and the fan level is 2, and so on; the fan level can be determined. A total of 5 different fan speed levels can be determined.			
Fan Indicator Auto / Manual	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display manual or auto fan speed on the screen.			
Fan Indicator Individual Level 1	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display the 1st fan speed level on the screen.			
Fan Indicator Individual Level 2	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display the 2nd fan speed level on the screen.			
Fan Indicator Individual Level 3	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display the 3rd fan speed level on the screen.			
Fan Indicator Individual Level 4	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display the 4th fan speed level on the screen.			
Fan Indicator Individual Level 5	1 – On / 0 – Off	1 bit	CRWTU
This object is used to display the 5th fan speed level on the screen.			

5.4.7.4. Fan Controller

In addition to the above, if the parameter “Fan control used for room controllers” is set to “Enabled” from the “GENERAL” parameter page, the configuration page that is related to fan control is now opened as “Fan Controller” under the “ROOM CONTROLLER” parameter page instead of the “LCD” parameter page. The image of the configuration page to be opened is shown above. The configuration settings in this section are configured such as the selection of fan speed level of the device to be used, the fan speed transitions regarding the percentage value to be changed, the manual or automatic fan speed selections, and all arrangements related to feedback reception of the current fan speed. In addition, differs from the “fan indicator”, this option is used for controlling the fans.

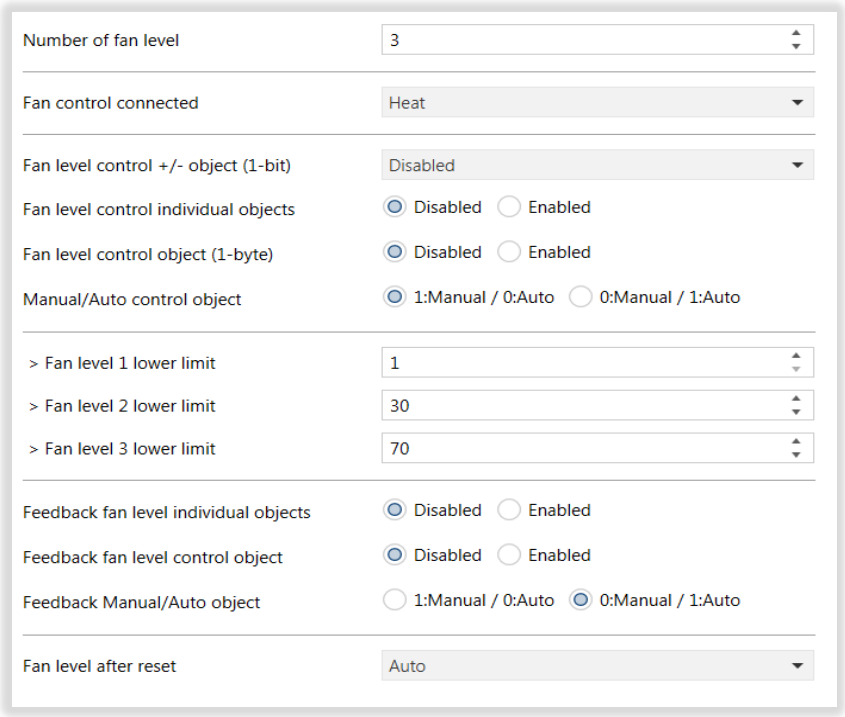


Fig. 35 : Fan Control Configuration Used For Room Controller

5.4.7.5. Parameters List

PARAMETER	DESCRIPTION	VALUES
Number of fan level	The number of fan levels is determined with this parameter.	**3** (1…5)
Fan control connected	This parameter allows the fan controls to work together with the "heating", "cooling" or "heating/cooling" system.	**Heat** Cool Heat & Cool
Fan level control + / – object (1 – bit)	This parameter allows the control of the fan speed with 1 – bit object.	**Disabled** 1 : İncrease / 0 : Decrease 1 : Down / 0 : Up
Fan level control individual objects	This parameter allows the control of the fan speed with 1 – bit individual objects.	**Disabled** Enabled
Fan level control object (1–byte)	This parameter allows the control of the fan speed with 1 – byte object.	**Disabled** Enabled
Manual / Auto control object	Manual or automatic fan speed control is selected with this parameter.	**1 : Manual / 0 : Auto** 0 : Manual / 1 : Auto
Fan level 1 lower limit	The lower limit value of the 1st speed is determined with this parameter.	**1** (1…100)
Fan level 2 lower limit	The lower limit value of the 2nd speed is determined with this parameter.	**30** (1…100)
Fan level 3 lower limit	The lower limit value of the 3rd speed is determined with this parameter.	**70** (1…100)
Feedback fan level individual objects	Fan speed feedback is received with individual objects by this parameter.	**Disabled** Enabled
Feedback fan level control object	Fan speed feedback is received with a 1-byte object by this parameter.	**Disabled** Enabled
Feedback Manual / Auto Object	Manual or automatic fan speed feedback is received with this parameter.	**1 : Manual / 0 : Auto** 0 : Manual / 1 : Auto

Fan level after reset	The desired fan level after a power failure is determined with this object.	**Previous value** Off Level 1 Level 2 Level 3 Auto

5.4.7.6. Objects List

Object Name	Function	Type	Flags
Fan Controller + / –	1 : Increase / 0 : Decrease 1 : Down / 0 : Up	1 bit	CRWTU
This object is used to increase or decrease the fan speed.			
Fan Controller 1 – byte	0 – OFF; 1 – Speed 1; 2 – Speed 2; 3 – Speed 3; 4 – Speed 4; 5 – Speed 5	1 byte	CRWTU
This object allows the fan speed to be controlled with 1-byte data.			
Fan Controller Individual Level 1	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to 1st fan level.			
Fan Controller Individual Level 2	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to 2nd fan level.			
Fan Controller Individual Level 3	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to 3rd fan level.			
Fan Controller Individual Level 4	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to the 4th fan level.			
Fan Controller Individual Level 5	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to the 5th fan level.			
Fan Controller Manual / Auto	1 – On / 0 – Off	1 bit	CRWTU
This object is used to switch over to automatic or manual fan speed control mode.			
Fan Controller 1 – byte Feedback	0 – OFF; 1 – Speed 1; 2 – Speed 2; 3 – Speed 3; 4 – Speed 4; 5 – Speed 5	1 byte	CRTU

This object indicates the fan speed status with a 1-byte value.			
Fan Controller Individual Level 1 Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the 1st fan speed status with a 1-bit value.			
Fan Controller Individual Level 2 Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the 2nd fan speed status with a 1-bit value.			
Fan Controller Individual Level 3 Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the 3rd fan speed status with a 1-bit value.			
Fan Controller Individual Level 4 Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the 4th fan speed status with a 1-bit value.			
Fan Controller Individual Level 5 Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the 5th fan speed status with a 1-bit value.			
Fan Controller Manual / Auto Feedback	1 – On / 0 – Off	1 bit	CRTU
This object indicates the manual/automatic fan operating mode with a 1-bit value.			

5.5. LCD Page

There is an LCD located at the middle of the device, vertically positioned, 40 x 90 mm (G x Y) sized and configurable backlight intensity. The configuration settings made with the ETS software and the symbols of the following controls can be displayed on the screen.

Symbol	Meaning	Symbol	Meaning
	Temperature(˚C or ˚F), relative humidity (percentage %) and CO2 concentration.		Heating (When the symbol is steady, it indicates that the device is in heating mode. If the heating system is active the heating symbol flashes.)
	Fan control (Automatic fan mode option and up to 5 fan levels control option.)		Cooling (When the symbol is steady, it indicates that the device is in cooling mode. If the cooling system is active the cooling symbol flashes.)
	Internal temperature information		Night mode
	External temperature information		Protection mode
	Thermostat ON / OFF		Comfort mode
	Alarm indicator		Standby mode
	Locking function		Setpoint temperature

5.5.1. General

This parameter can be used to adjust the brightness level of the display, to show the actual temperature, the outside temperature, the relative humidity, the air quality level, to configure switching time between them, to show whether the horizontal lines will appear on the display, to control the display on/off status information.

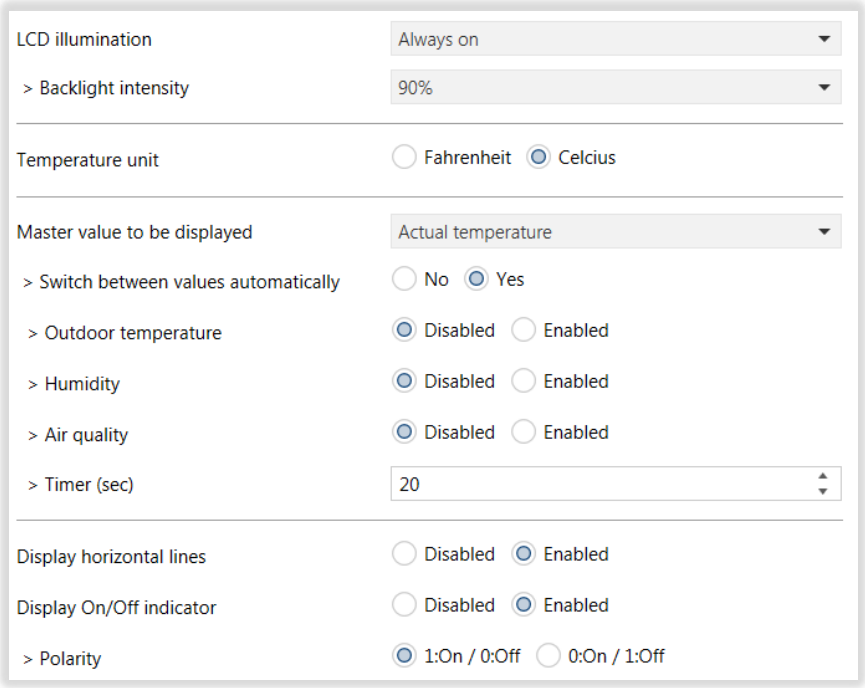


Fig. 36 : LCD General Configuration Section

5.5.1.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
LCD illumination	The illumination of the display is controlled with this parameter. **Always off :** LCD illumination is always off. **Always on :** LCD illumination is always on. **Auto switch down :** The display is turned off or switches to a new illumination level after the set time(1...255 sec) elapsed.	Always off **Always on** Auto switch down
Backlight intensity	The backlight intensity of the LCD is configured with this parameter.	**90%** (10%…100%)
Timer (sec)[*1]	The illumination time of the LCD is configured with this parameter.	**60** (0…255)
Intensity after timer[*1]	The illumination intensity of the LCD screen is determined after the time defined by this parameter is over.	**30%** (10%…100%)
Temperature unit	The temperature unit type to be displayed is defined by this parameter.	Fahrenheit **Celcius**
Master value to be displayed	The master value to be displayed on the screen is selected with this parameter.	**Actual temperature** Setpoint temperature Outdoor temperature Humidity Sensor Air quality
Switch between values automatically	it is determined with this parameter whether the setpoint temperature, air quality, humidity, outdoor temperature information will appear in the main display, and then switch between them automatically.	**No** Yes
Setpoint temperature[*2]	Whether the setpoint temperature is displayed on the LCD screen is determined with this parameter.	**Disabled** Enabled
Outdoor temperature[*2]	Whether the outdoor temperature is displayed on the LCD screen is determined with this parameter.	**Disabled** Enabled
Air quality[*2]	Whether the air quality is displayed on the LCD screen is determined with this parameter.	**Disabled** Enabled

Timer (sec) [*2]	Bu parametre ile ana ekrandaki değer ve diğer değerlerin otomatik olarak geçiş zamanı belirlenir.	**20** (0…255)
Display horizontal lines	Whether the horizontal separating lines are displayed on the LCD screen is determined with this parameter.	**Disabled** Enabled
Display On / Off indicator	Whether the On / Off indicator is displayed on the LCD screen is determined with this parameter.	**Disabled** Enabled
Polarity[*3]	On / Off indicator's operation mode is determined with this parameter.	**1 : On / 0 : Off** 0 : On / 1 : Off
Display Heat / Cool requirement indicator	It is determined, whether the indicator on whether the heating/cooling system is operating will be shown on the display, with this parameter	**Disabled** Enabled

[*1]This parameter is only visible, when the parameter "LCD illumination" is set to "Auto switch down".

[*2]This parameter is only visible when the parameter "Switch between values automatically" is set to "Yes".

[*3]This parameter is only visible, when the parameter "Display On / Off indicator" is set to "Enabled".

5.5.1.2. Objects List

Object Name	Function	Type	Flags
LCD Backlight Intensity	0% – 100%	1 Byte	CRWTU
This object is used to configure the LCD's backlight intensity.			
LCD On / Off indicator	On / Off	1 Bit	CRWTU
This object is used to control the "On" and "Off" indicators that are displayed on the LCD screen.			
External Air Quality	0 (ppm) – 670760 (ppm)	2 byte	CRWTU
This object is used to display external air quality value on the LCD screen.			
External Outdoor Temp.	0 (°C) – 670760 (°C)	2 byte	CRWTU
This object is used to display external outdoor temperature values on the LCD screen.			

5.5.2. Buttons

There are 2 buttons on the LCD screen. These buttons are located above and below the middle part. The general purpose of the buttons is designed to change the setpoint temperature. It is possible to select the different controls required by the button settings in the parameters section and to lock the buttons through an object and define different controls as short press, long press.

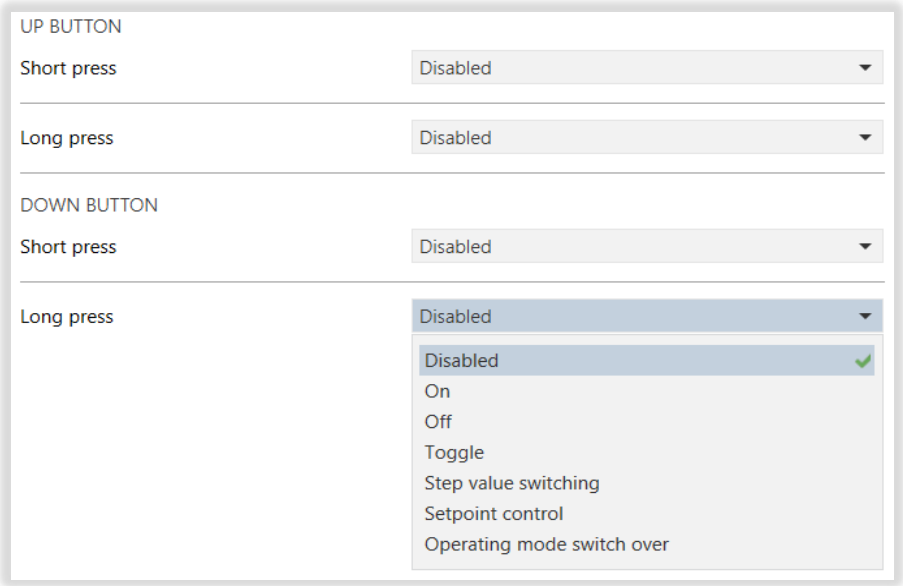


Fig. 37 : LCD Button Configuration

5.5.2.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
Short press	This parameter determines the type of data to be sent when a short press action occurs.	**Disabled** On Off Toggle Step value switching Setpoint control Operating mode switch – over
Locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Sending delay	When an event occurs, this parameter allows configuring telegram sending time to bus line. Values are entered in seconds. Entering the “0” value means which the telegram is sent to the bus line without delay.	**0** (0…255)
Sending periodically	This parameter is used to periodically send the commands to the bus line.	**Disabled** Enabled
Period of sending (sec)	This parameter determines sending periods of the commands to the bus line.	**0** (0…255)

Modification by pressing	This parameter is used to switch between operating modes.	**Comfort mode** Standby mode Night mode Building protection mode Comfort & Standby Comfort & Night Comfort & Standby & Night All
Long press	This parameter determines the type of data to be sent when a long-press action occurs.	**Disabled** On Off Toggle Step value switching Setpoint control Operating mode Switch – over
Locking	This parameter determines whether the push-button lock is enabled with an additional locking object. When this function used, the locked push button does not send any data to the bus line. **Disabled :** With this option, device lock is disabled permanently. **Lock on value 0 :** When a logic 0 value is sent to a push-button locking object, the push button will be locked. **Lock on value 1 :** When a logic 1 value is sent to a push-button locking object, the push button will be locked.	**Disabled** Lock on value 0 Lock on value 1
Sending delay	When an event occurs, this parameter allows configuring telegram sending time to bus line. Values are entered in seconds. Entering the “0” value means which the telegram is sent to the bus line without delay.	**0** (0…255)

Sending periodically	This parameter is used to periodically send the commands to the bus line.	**Disabled** Enabled
Period of sending (sec)	This parameter determines sending periods of the commands to the bus line.	**0** (0…255)

5.5.2.2. Objects List

Obje Adı	Fonksiyonu	Tipi	Bayrakları
LCD Up/Down Button Short/Long – On	ON / OFF	1 bit	CRTU
“ON” telegram will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Off	ON / OFF	1 bit	CRTU
“OFF” telegram will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Toggle	ON / OFF	1 bit	CRTU
“Toggle” telegram will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Feedback Toggle	Status	1 bit	CRWU
This object appears only when the toggle function is enabled. Output status is shown via this object connected to related group address.			
LCD Up/Down Button Short/Long – Step 1 Byte	1-byte unsigned value / Percentage	1 byte	CRTU
The 1-byte value sent by this object can be in the range (0 – 255). Values will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Step 2 Byte	2 byte unsigned value	2 byte	CRTU
The 2-byte value sent by this object can be in the range (0 – 65535). Values will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Step Percentage	Percentage (%)	1 byte	CRTU
The percentage value sent by this object can be in the range (0 – 100). Values will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Step Temperature	Temperature (Celcius)	2 byte	CRTU
The temperature setpoint value sent by this object can be in the range (0 – 50°C). Values will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Step Luminosity	Luminosity (Lux)	2 byte	CRTU
The luminosity value sent by this object can be in the range (0 – 1000). Values will be sent via this object connected to related group address.			

LCD Up/Down Button Short/Long – Step Scene	Scene control	1 byte	CWT
The scene call value sent by this object can be in the range (0 – 64). Values will be sent via this object connected to related group address.			
LCD Up/Down Button Short/Long – Locking	0 – Disable / 1 – Enable 1 – Disable / 0 – Enable	1 bit	CWT
This object appears only when the locking function is enabled. Via the related group address, it is possible to lock the push button by configuration is done before.			
LCD Up/Down Button Short/Long – Operating Mode	HVAC	1 byte	CRTU
Switching between the operating modes is possible via this object connected to related group address.			
LCD Up/Down Button Short/Long – Setpoint Temperature	Temperature (°C)	2 bytes	CRTU
The selected setpoint temperature for the push-button is controlled via this object connected to related group address.			
LCD Up/Down Button Short/Long – Feedback Setpoint Temperature	Temperature (°C)	2 bytes	CRTWU
The status of the selected setpoint temperature for the push button is received via this object connected to the related group address.			

5.6. Humidity Sensor

The integrated humidity sensor on the device provides the measurement of the relative humidity value in the ambience. The measured value allows you to perform upgraded room thermoregulation and to expand combinations for the safe operation of some type of terminal equipment used for cooling. The measured value can also be sent to the KNX bus line via a 2-byte communication object. The psychrometric values obtained from the temperature and humidity combination measurement such as dew–point temperature on the KNX bus line and the perceived temperature index (in summer mode only) can also be sent, with the calculation made by the thermostat.

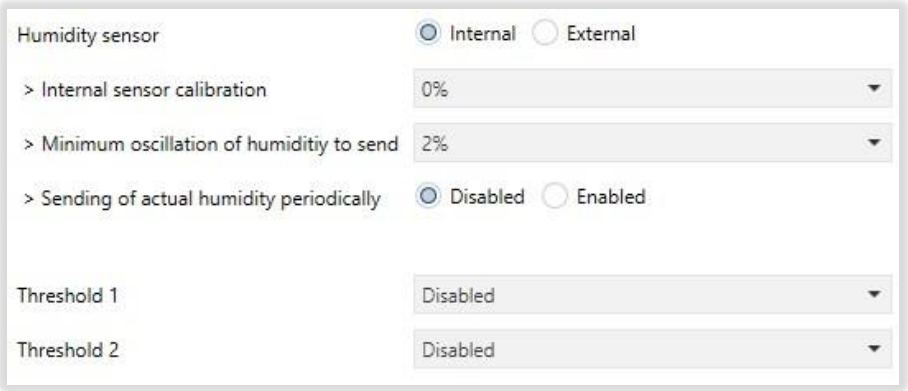


Fig. 38 : Humidity Sensor Configuration Page

5.6.1. Parameters List

PARAMETER	DESCRIPTION	VALUES
Humidity sensor	This parameter determines whether the humidity sensor is external or internal.	**Internal** External
Internal sensor calibration	This parameter determines the percentage of internal sensor calibration.	**0%** (–10%…10%)
Minimum oscillation of humidity to send (%)	This parameter determines the minimum oscillation value for the output object to send the humidity value.	Disabled, 1%, **2%**, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10%
Sending of actual humidity periodically	This parameter allows the periodically measured humidity to be sent. The periodic transmission time can be selected between the range of 1 to 255.	**Disabled** Enabled
Threshold 1	The first threshold value property is activated by this parameter.	**Disabled** High Low
Higher limit (%)	The higher limit of the first threshold is determined by this parameter.	**90** (0…100)
Lower limit (%)	The lower limit of the first threshold is determined by this parameter.	**30** (0…100)
Threshold 2	The second internal threshold value property is activated by this parameter.	**Disabled** High Low
Higher limit (%)	The higher limit of the second threshold is determined by this parameter.	**90** (0…100)
Lower limit (%)	The lower limit of the second threshold is determined by this parameter.	**30** (0…100)

5.6.2. Objects List

Object Name	Function	Type	Flags
Actual Relative Humidity	Humidity (%)	2 byte	CRTU
The actual relative humidity is received with this object via connected to a related group address.			
External Relative Humidity	Humidity (%)	2 byte	CRWTU
The external relative humidity is received with this object via connection to the related group address.			
Humidity Threshold 1	1 – True / 0 – False	1 bit	CRTU
The first threshold value property for relative humidity is configured by this object.			
Humidity Threshold 2	1 – True / 0 – False	1 bit	CRTU
The second threshold value property for relative humidity is configured by this object.			

CONTACT INFORMATION

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EUROPE, Turkey

Interra
Cumhuriyet Mah. Kartal Cad. Simkan Plaza No:95/1
Kartal/İstanbul
Tel: +90 (216) 326 26 40 Fax: +90 (216) 324 25 03
Web adress: http://www.interratechnology.com